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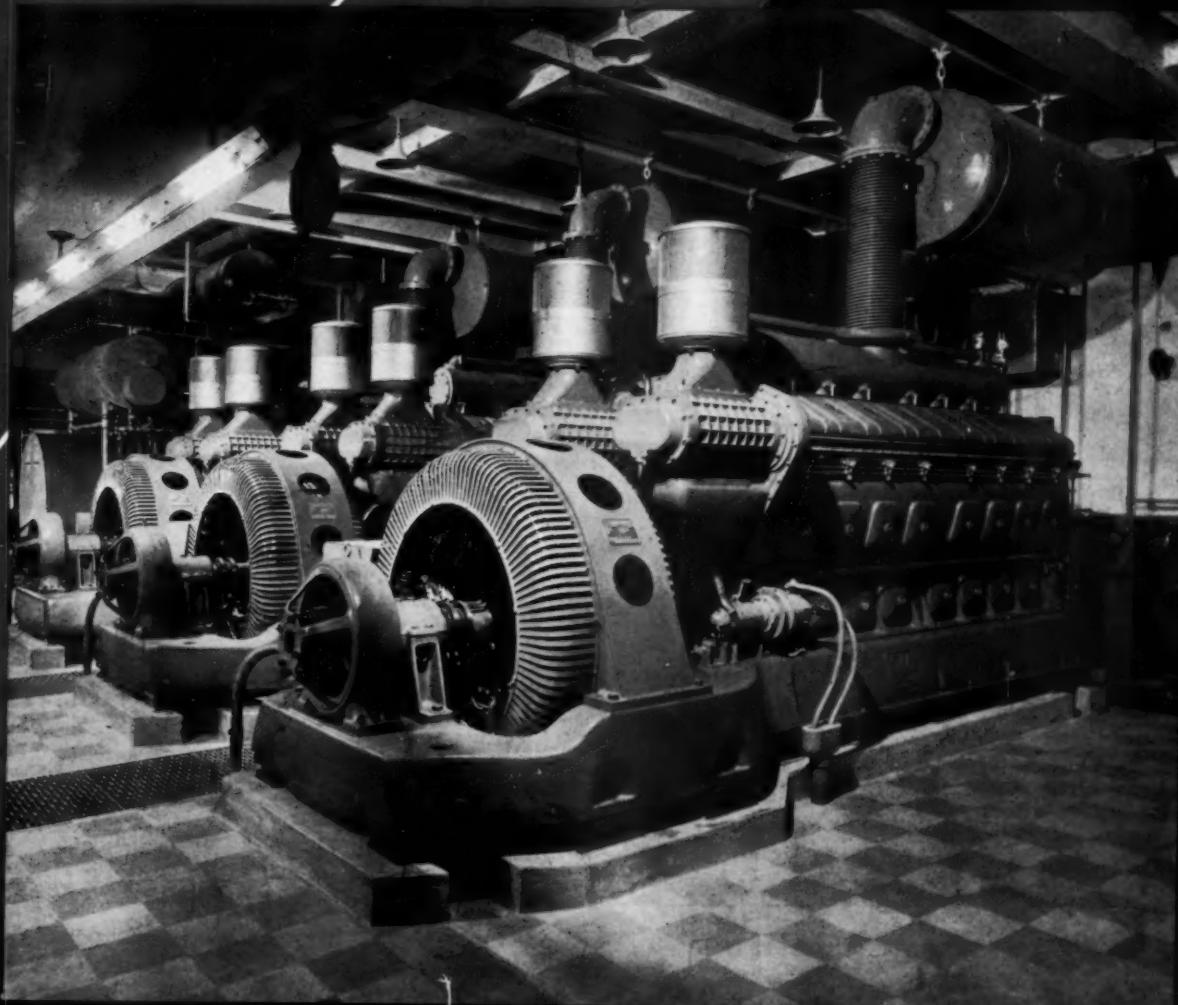
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ROGRESS



AUGUST, 1944

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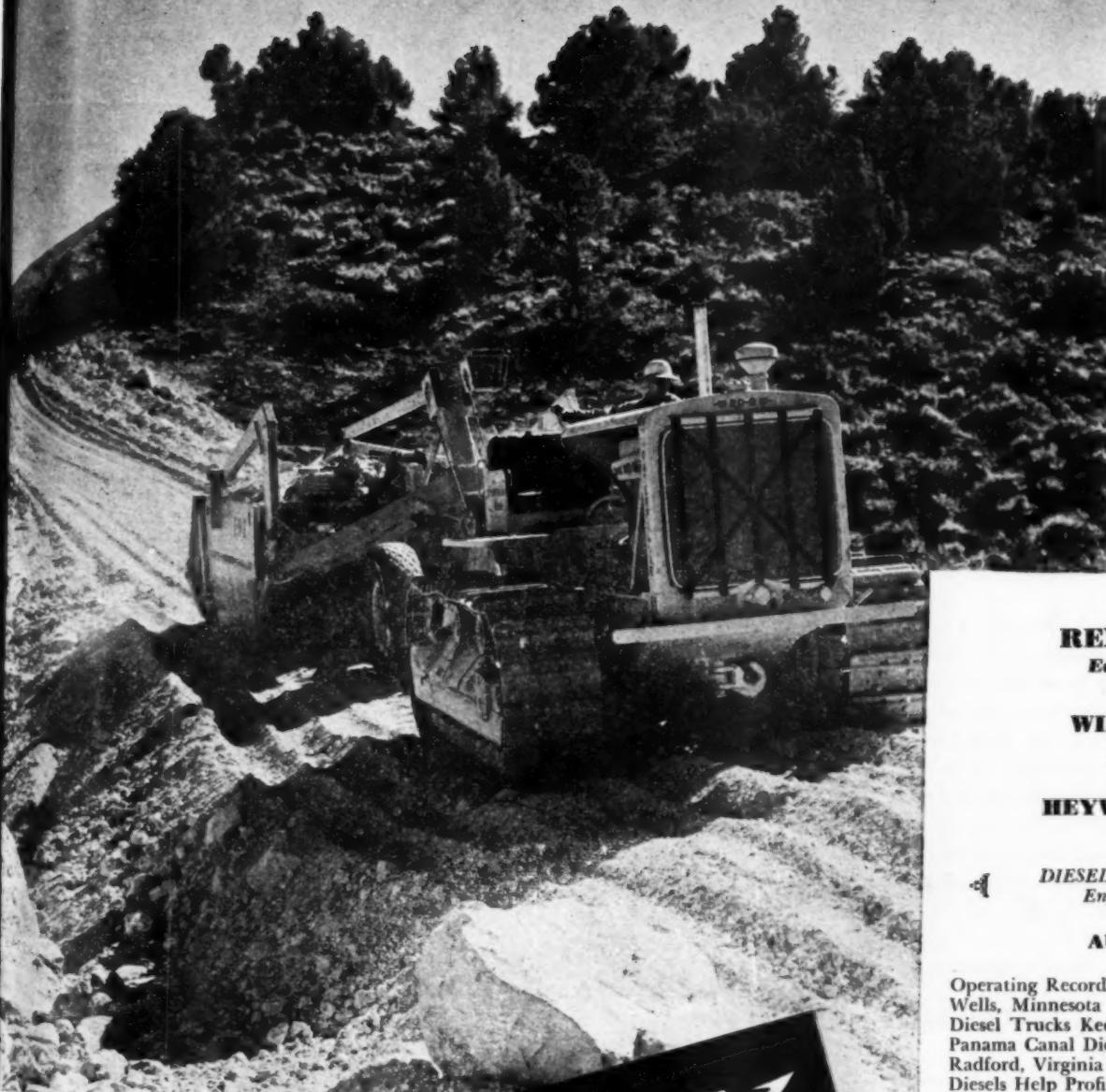


TEXACO Lubricants and Fuels

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DIESEL PROGRESS, for August, 1944. Volume X, Number 8. DIESEL PROGRESS is published monthly by Diesel Engines, Inc., 2 West Forty-fifth St., New York 19, N. Y. Rex W. Wadman, President. Acceptance under the Act of June 5, 1943, at East Stroudsburg, Pa., authorized March 27, 1940. Subscription rates: \$5.00 per year, single copy 50c.



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DIESEL PROGRESS Is Indexed by
Engineering Index Service

AUGUST CONTENTS

Operating Record of Diesel Tug "Keith"	48
Wells, Minnesota	50
Diesel Trucks Keep Logs Rolling	52
Panama Canal Diesel-Electric Tug "Cardenas"	54
Radford, Virginia	55
Diesels Help Profits In Grain Growing	58
Laying Cable The Easy Way With Diesels	62
Over North America's Roof With Diesels Part III	64
Laboratory Control Of Filter Manufacture	69
Looking Toward A Strong Merchant Marine	74
Supervising And Operating Engineers' Section	76
Exchange Your Diesel Maintenance Ideas Section	78

FRONT COVER ILLUSTRATION: View of the three main generating units in the Alfred I. duPont Building, Miami, Florida—General Motors, 16-cylinder, 2-cycle Diesels of 1050 hp. each at 600 rpm.

TABLE OF CONTENTS ILLUSTRATION: Caterpillar Diesel Tractor at work on a 3-lane short cut between Virginia City and Reno, Nevada. With this and six more Diesel outfits a cut 60 ft. deep, 200 ft. long, was built in 40 hours.

DIESEL PROGRESS for August, 1944, Vol. X, No. 8. Published monthly by Diesel Engines, Inc., 2 West 45th Street, New York 19, N. Y. Tel. MURray Hill 2-7333. Subscription rates are \$5.00 for U.S.A. and possessions. All other countries \$7.50 per year. Subscriptions may be paid the London office at £1-17s per year.

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DIESEL TUG TURNS IN A STARTLING RECORD

By WILL H. FULLERTON

HERALDED as the first "Open River" type of tug ever built, the *Keith* went into service on the man- and boat-killing Columbia river January 1, 1940 and as the record shows, her twin supercharged, 1,000 hp. Enterprise Diesels under the watchful eye of Captain Leppaluto have turned in remarkable performance. This unique craft was fully described in the March 1940 issue of DIESEL PROGRESS.

No man who has lived with, and in spite of, the wild upper reaches of the Columbia could be other than humble as you will see as we let Captain Leppaluto tell his own story of the *Keith*.

"I have been told so many times that I am plumb crazy and it is impossible for any boat to put out the performance record that our tug *Keith* has made since she went into commission on January 1, 1940. . . . I have gone back through the operations of this vessel and have taken from her log book, and other records that we have in our office, the complete operating record. Therefore, although this record seems to be more or less of a fantastic substance, here it is:

"Today the tug *Keith* has been in operation 4 years, 3 months, 15 days.

"The *Keith* has been in operation 1,659 days or a total of 35,250 hours.

"The operating hours as per year are as follows:

Year	Hours	Days
1940	7,608	317

"The tug *Keith* was out of operation 48 days during 1940 due to the fact that the Army Engineers were repairing the Celilo Canal and all navigation on the upper river was at a standstill during the latter part of 1940 and the early part of 1941.

1941	8,232	343
------	-------	-----

"The tug *Keith* was out of operation a total of 22 days; tied up for 17 days on account of repairs being made to the Celilo Canal and all operations were at a standstill. The other 7 days were used up for hull repairs and engine maintenance.

1942	8,304	346
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"The tug *Keith* was out of service for 19 days for hull and engine repairs.

1943	8,280	350
------	-------	-----

"The tug *Keith* was out of service 15 days due to ice on the Columbia River and impossible to run. During this 15 days period the boat was dry-docked and engines were torn down and inspected.

1944 (3 mo., 15 days) 2,712 113

"The tug *Keith* lost 24 hours time for engine repairs.

"This shows total 35,136 hours and total 1,469 days that the *Keith* has operated.

"The *Keith*'s usual run is between The Dalles, Oregon, and Umatilla, Oregon, and The Dalles, Oregon, and Pasco, Washington.

"The distance between The Dalles and Umatilla, Oregon, is 100 miles. The distance between The Dalles and Pasco is 150 miles.

"When operating between The Dalles, Oregon,

and Umatilla, Oregon, the tug *Keith* makes 20 trips per month. When operating between The Dalles, Oregon, and Pasco, Washington, she makes 20 trips per month.

"The size of the barges handled by the *Keith* are 1,000 ton barges.

"The *Keith* moves approximately 200,000 tons of cargo per year plus the general towing that she does in addition.

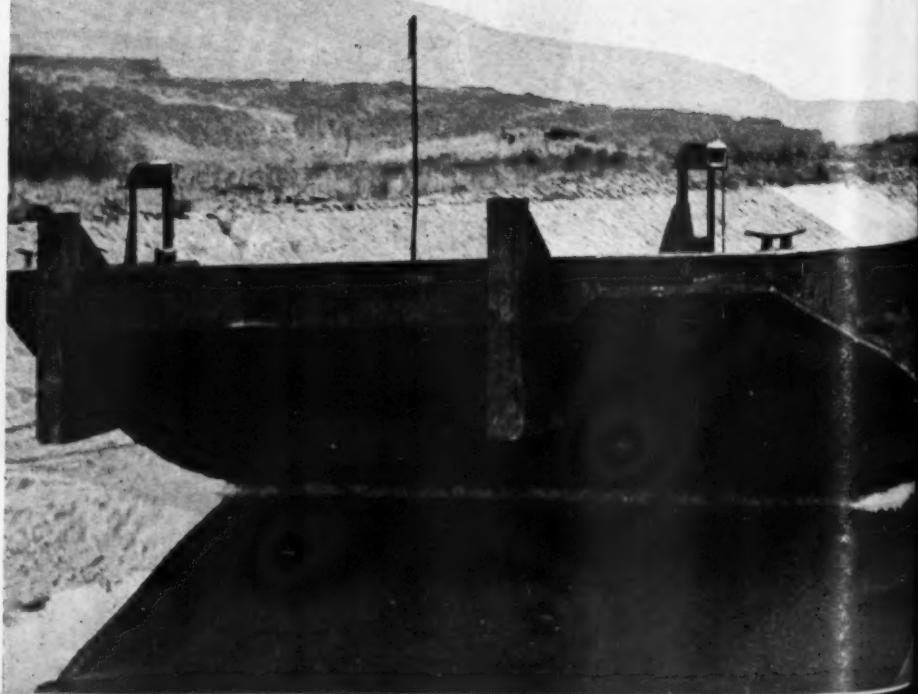
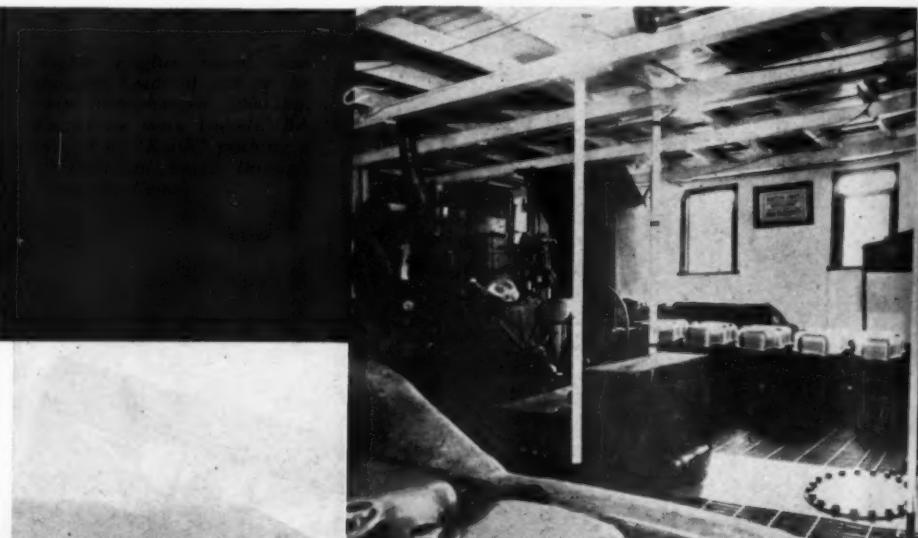
"The average velocity of the current in the river is 5 miles per hour.

"The maximum velocity in the rapids is 15 miles per hour.

"The average running speed with loaded barge is 12 miles per hour.

"Rpm. in rapids—650 to 675.

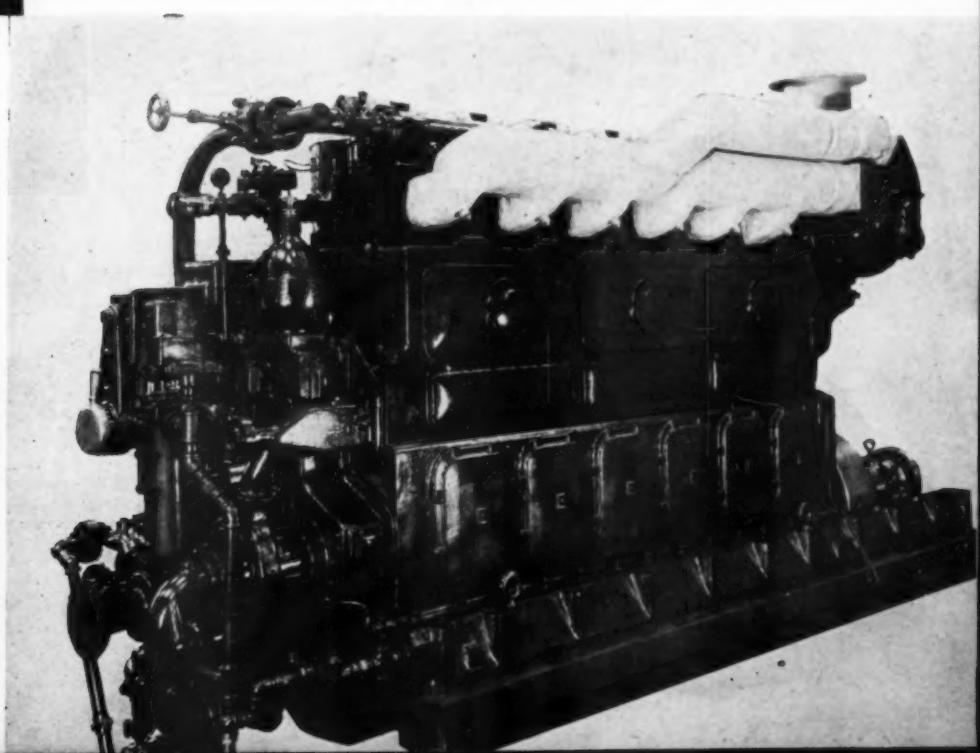
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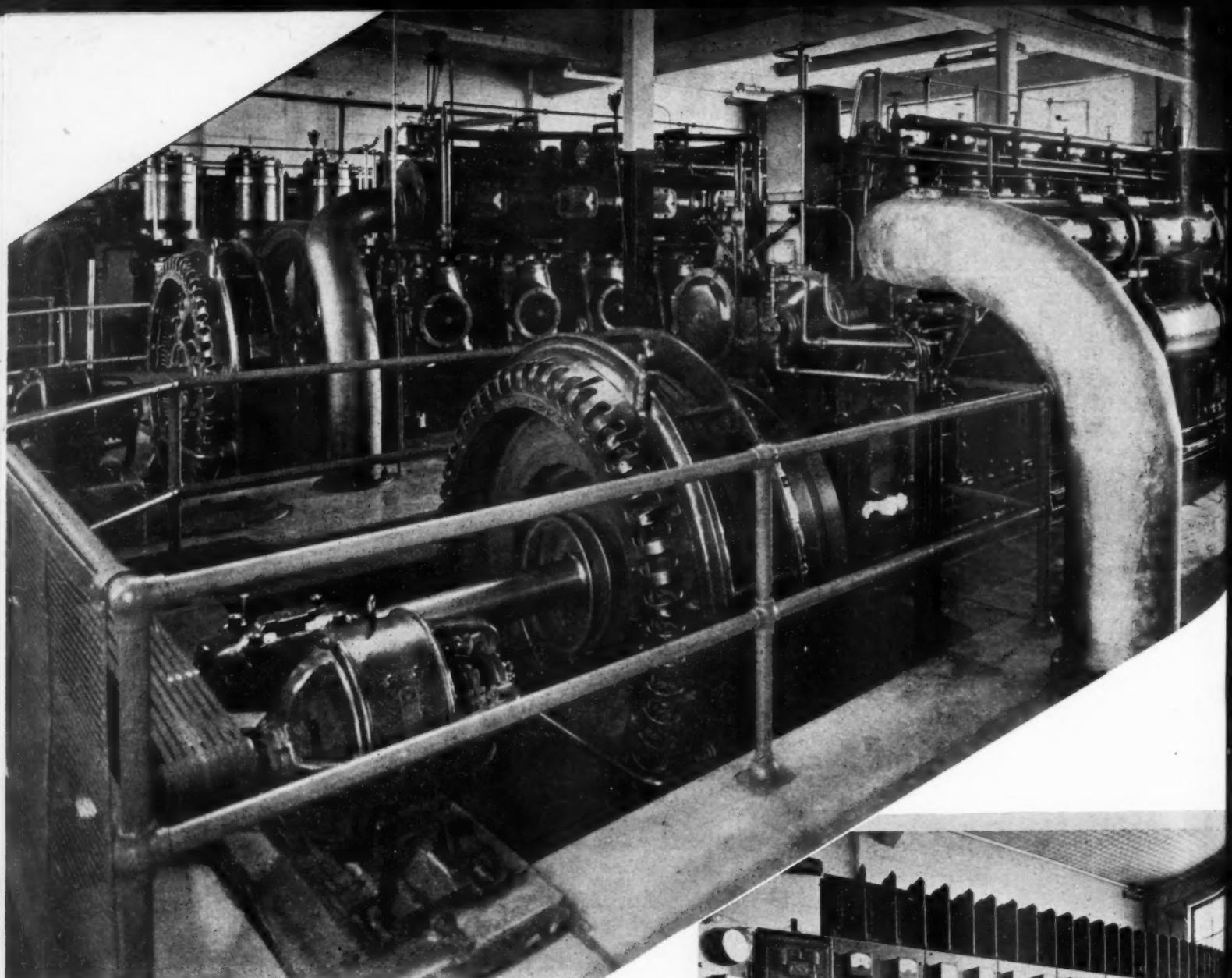




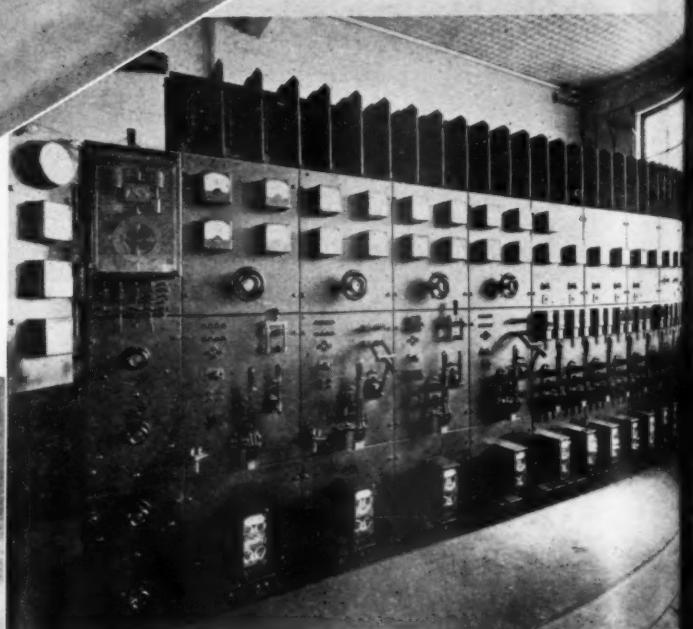
Closeup of the 2000 hp. "Keith" in the Celilo Canal.

View of the 6-cylinder, 1000 hp. turbocharged Enterprise Diesel, two of which were installed in the "Keith" in 1939.

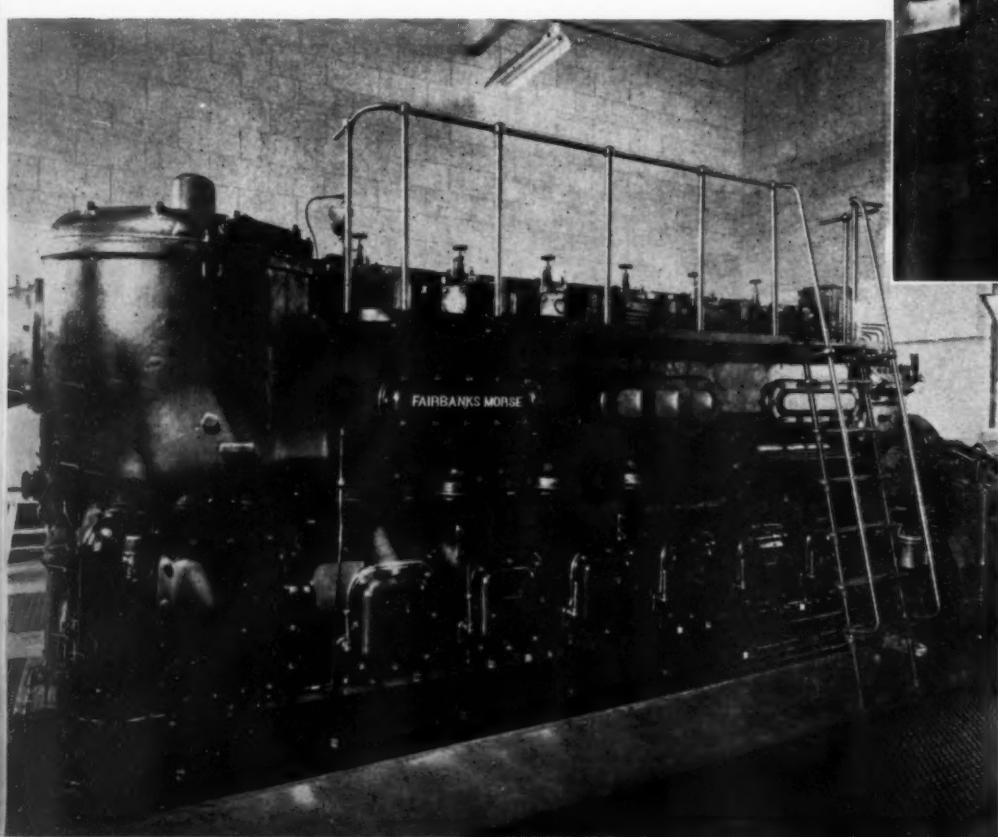




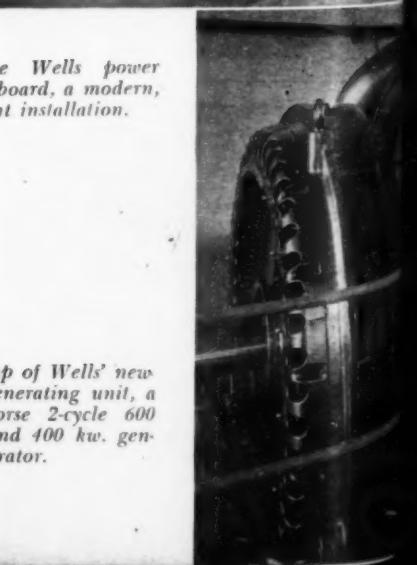
The two F-M units in the background were installed in 1930; the foreground unit, a 600 hp., 6-cylinder F-M Diesel is the fourth and most recent addition, installed in 1936.



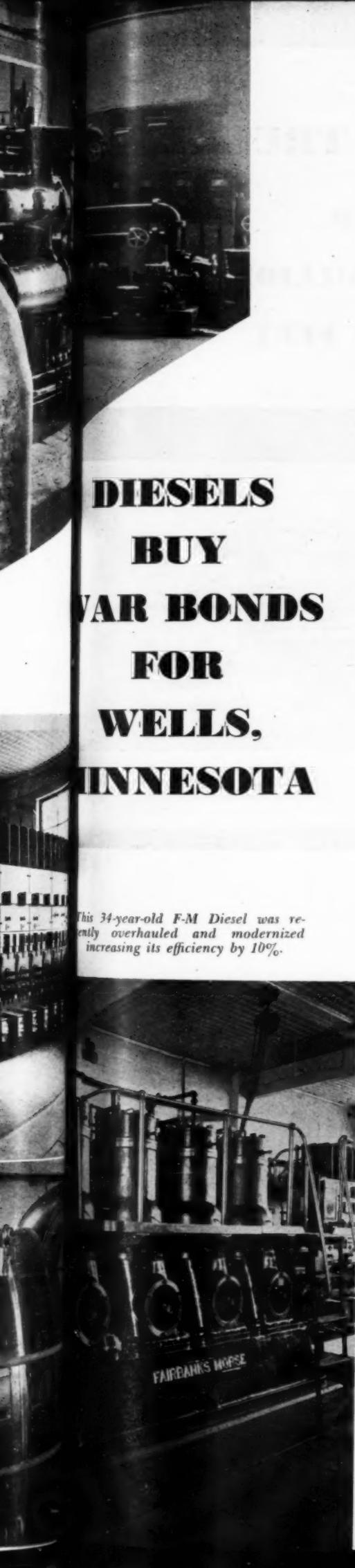
Above: The Wells power plant switchboard, a modern, dead front installation.



Left: Close-up of Wells' newest Diesel generating unit, a Fairbanks-Morse 2-cycle 600 hp. Diesel and 400 kw. generator.



This 34-year
only over
increasing



DIESELS BUY WAR BONDS FOR WELLS, MINNESOTA

This 34-year-old F-M Diesel was recently overhauled and modernized increasing its efficiency by 10%.

By T. J. MALONE

WELLS, an alert village of 2500 in Southern Minnesota now observing its seventy-fifth anniversary, owes to its municipally owned Diesel electric light and power plant the fact that, besides being out of debt, it rejoices in a cash surplus which includes \$151,000 in war bonds.

In thirteen and a half years of operation, the plant, in addition to paying in full its own cost of around \$175,000, has contributed from earnings a total of \$120,000 toward wiping out other village indebtedness. Of this amount, \$44,000 went to retire bonds still outstanding on the old steam plant which the present plant replaced, \$52,000 for sewers, \$8,000 for paving and \$16,000 to cancel a long-time village carry-over. With all debt written off, as by a fairy godmother, \$30,000 has been transferred to the village from plant surplus for reduction of taxes.

These pay-outs plus the war bond surplus come to \$476,000 which is \$190 for every man, woman and child in the town.

Expanding industries in Wells account for a present heavy demand for power service. A large produce plant, dealing in eggs, chickens, ducks and turkeys, with a hatchery said to incubate a million chicks a year, needs much power for its refrigeration and temperature control systems. There is another hatchery, too, and a cannery, two grain elevators and a hemp factory. The cannery, which has processed only corn and peas, looks to canning other vegetables as well, and so will require more power. A rural electric cooperative serving several hundred subscribers gets its power from the Wells plant. The government-owned hemp factory, located outside the village, is a member of the cooperative. With these war-serving industries manned to their limit, there is a housing shortage in the village. A 50-trailer housing group is to be erected within the village, under federal housing authority, to provide homes for workers. It will get electric service from the village plant.

In 1930, an old steam plant in Wells in use since 1895 (low-pressure boiler, reciprocating engines) was replaced by three Fairbanks-Morse Diesel generating units, with a change from D. C. to A. C., as follows: a 120 hp., a 240 hp., and a 300 hp., each with Fairbanks-

Morse auxiliary equipment. Six years later a Fairbanks-Morse Diesel engine was installed, a 600 hp. unit with auxiliaries.

What of their operation? For 1937 the kilowatt-hour volume produced was 891,500; the per-kilowatt-hour cost was 1.65 cents, including all charges—as against 2.35 cents in 1930, when operating in part with steam. In 1943 the volume was 2,262,300 kilowatt hours and the unit cost 1.24 cents, including fixed charges.

The 240 hp. and 300 hp. Diesel engines were overhauled recently by putting in new type cylinders and pistons, with a 10 per cent increase in efficiency as a result. Cost of the remodeling was paid for readily out of plant earnings. Other Fairbanks-Morse equipment installed in the village includes two turbine pumps which draw the water supply from deep wells.

"Any special problems in operating the Diesel equipment?" was asked of Fred Leider, superintendent of the power plant since 1922.

"None," he replied. "The plant is efficient. Fuel cost is low. For what it cost in coal to produce a half million kilowatt hours with the old steam plant we now get 2,000,000 kilowatt hours with fuel oil. Our main concern is to serve our heavy demand. We are always pushed. Two engines, the 240 hp., and the 600 hp. are kept running about 18 hours a day."

Appointees to the three-member water, light, power and building commission are retained term after term. J. C. Kirschner, Chairman, 80 years old, has served for 22 years. N. T. Nelson, the first white child born in Wells—in 1871, when it was "Indian country"—has served more than 20 years. G. H. Ellig is the junior member.

A stranger driving through Wells and noting its paved streets, its numerous churches and its beautiful high school would know at once that here was a "quality" town. Its being that, goes far to explain its success with the power plant. Its people have not been divided by factionalism. They pull together. When they assign a good man to a public responsibility, they stand behind him, give him a free hand and keep him on the job.

“OLD CHRIS” COLUMBUS, no doubt, never heard of Paul Bunyan and Babe, his big blue ox. Otherwise he would never have stopped short of discovering America by, putting in at the Island of Santa Domingo just for the spices that those days were both meat preservatives and deodorants for milady's “glow.”

But the bets are down that Chris would have headed into the wind for the Columbia, the Fraser or some other Pacific Coast river if he could have foreseen an industry that in the first 47 weeks of the year 1943 has grossed 7,181,590,000 board feet out of an estimated 546,208 million board feet of sawlog size, or just about double the estimated single year's growth. Which means a depletion of less than one per cent per year. Or to be exact, .973 per cent. The estimated growth of merchantable lumber is 3,500,000,000 feet, annually.

Yet, it's not a busted gallus to what the Diesel engine is doing for the lumber industry and its conservation plan. The low operating cost and its ability to go where nothing else has been, plus speed and flexibility, means that when the Diesel tractors have yarded the tree sections where the Diesel truck can reach 'em, they go out at rock bottom cost to begin their conversion into lumber, plywood and pressed-wood, the latter two being formerly fuel for the mill burners or insulation for the natural ice storage houses.

It is questionable if anywhere in industry the Diesel truck has insisted on doing more than for the lumberman and his associates and their customers. It hauls the logs, sixty tons to the load. A log with a ten-foot butt and a gross of 35 tons is just a matter of getting it on the bunks and then over a dozed out road with reasonable traction and generally unreasonable grades, to market it goes.

Where before, second growth was chewed up by quarter-inch saws with a corresponding amount of waste in excess sawdust, and a what-the-heck, now slim eighth-inches coyly inch their way through with a minimum of waste and the shorts and the narrows upon reaching the factory are glued and dovetailed front and center for standard structural requirements. Then, onto the Diesel truck they go again, this delivery making them the icing on the cake—clear profit. Conservation, what?

Too, the sawdust is used, even fairly good rough stuff gets crushed and ground, a binder added for, what do you know, wood-dough. It's gimmy for making airplane jigs, forming dies and checking fixtures. It's like pistol-packing mom-

DIESEL TRUCKS

AND

SEVEN BILLION

BOARD FEET

By JIM MEDFORD



Above: A Peterbilt, Cummins Diesel engined truck with a load on its back and a bigger utility trailer load hooked behind.





ack



Left: A Kenworth, Cummins Diesel truck with a pretty big load of logs. This equipment gets about 6 miles per gallon of Diesel fuel.

ma—it's a *hold-up* for parts in the making. And the Diesel truck brings 'em in and takes 'em away on the plant-to-plant and "vender"-to-final-assembly runs.

Loggers have learned it pays to construct good roads for their trucks. Some as wide as forty feet with gravel surface, even oiled, have been laid. In some of the wet, swampy ground, plank roads are not unknown. In other cases loggers have deemed it wise to operate constantly over solid wooden highways. And it was Diesel tractors that put the grades in.

Diesel logging engines are placed as soon as the roads are in, the cable lines are rigged for bringing in the logs, the "fallers" go into the

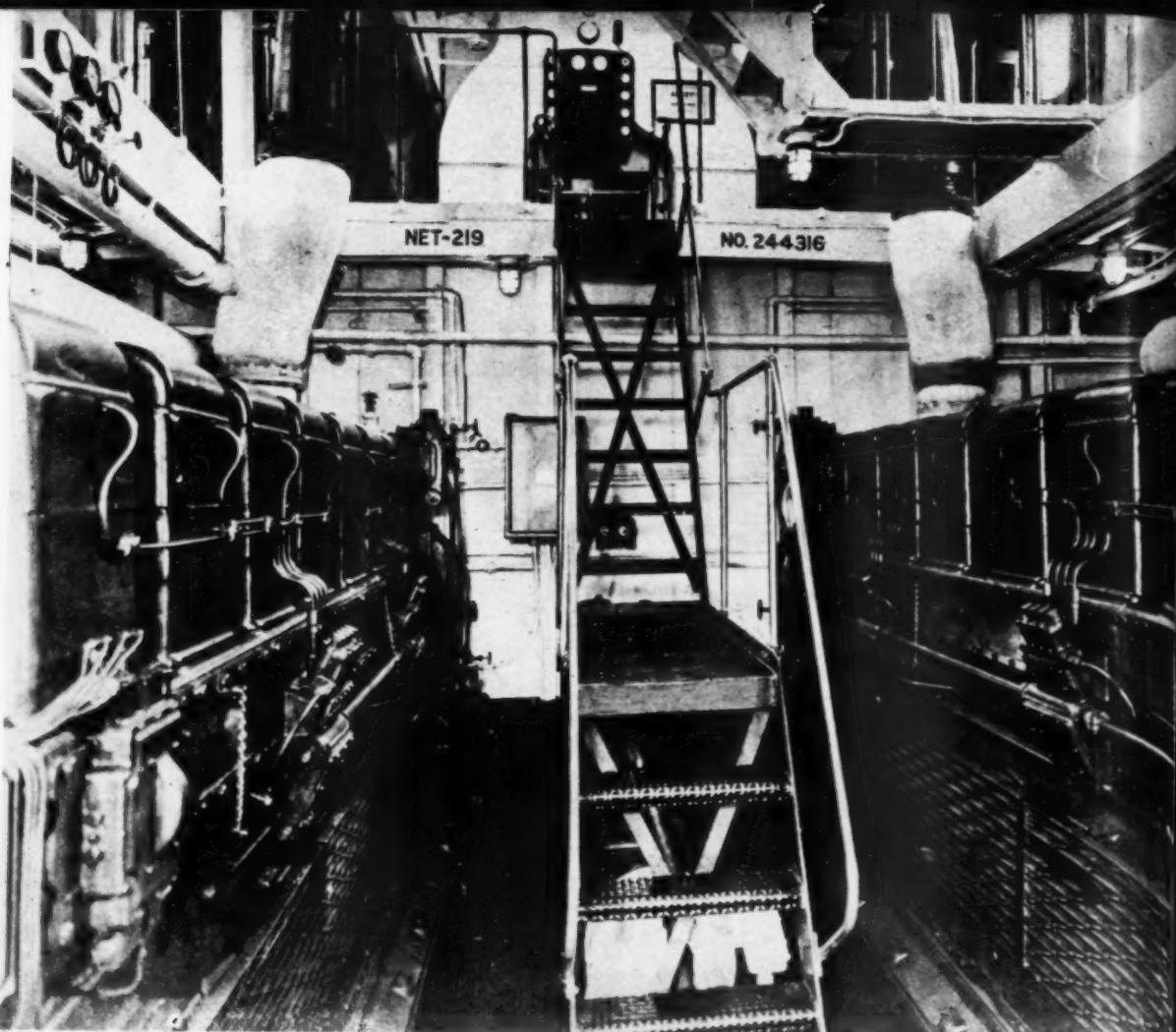
Out on the road the Cummins Diesel engined truck moves along at good pace making 6½ miles per gallon of fuel.

woods and their crosscuts sing their high pitched whine, often with the Diesel engine furnishing power and keeping time with its bass-voiced exhaust.

"Snipers" cut away the limbs and branches, "buckers" log the trunk, "chokers" are noosed around the logs, main lines hook onto the chokers and the logging Diesel snakes the sections to the spar tree and up onto the Diesel truck, if they are not "cold decked" to await transportation.

Serving as its major purpose, the hauling of logs from stump to loading point, the Diesel logging engine is truly the Paul Bunyan of the woods, a giant of power and stamina.

Right: Engine room view of the tug "Cardenas," showing the two 677 hp. Cooper-Bessemer main Diesels. Below: The "Cardenas" on trial run near Baltimore before sailing in convoy to Panama Canal Zone.



DIESEL-ELECTRIC SEA-GOING TUG, "CARDENAS"

THE Diesel-electric sea-going tug *Cardenas* is attached to the Dredging Division of the Panama Canal Department and she is equipped with two Cooper-Bessemer Diesel engines rated at 677 horsepower at 450 revolutions per minute. The engines are directly connected through a water-tight bulkhead to 400 kw. direct current Westinghouse main propulsion generators and a 75 kw. generator, which is an oversized exciter, providing excitation current as well as current for auxiliary services. The generators drive a 1000 horsepower Westinghouse main propulsion direct current motor having a double armature.

The *Cardenas* is one of three sister vessels built by the Spedden Shipbuilding Co., Baltimore, Md., for the Panama Canal Department. The other two are the *San Pablo* and the *Culebra*, which also are powered by Cooper-Bessemer Diesels. The tugs are at work moving barges and dredging equipment and at other general harbor duties required in the maintenance of the Panama Canal.

The Panama Canal Department, which is in charge of the general welfare of the Canal Zone, sent their own crews to Baltimore to bring the tugs back, joining South-bound convoys en route.

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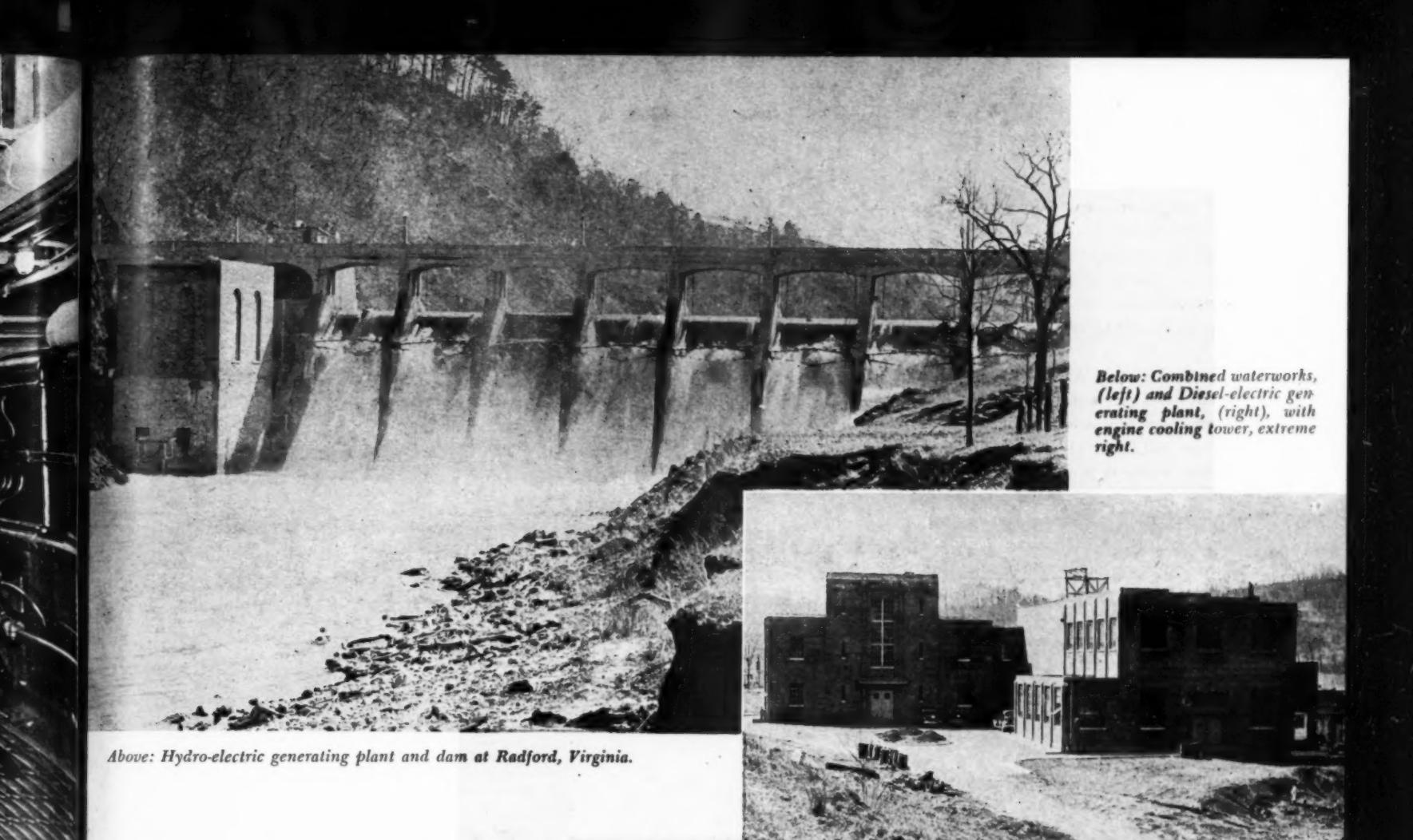
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Above: Hydro-electric generating plant and dam at Radford, Virginia.

Below: Combined waterworks, (left) and Diesel-electric generating plant, (right), with engine cooling tower, extreme right.

BECAUSE so much has been written about Diesel-electric generating stations where the sole prime mover is the Diesel engine, many fail to realize that successful systems are in operation in which the Diesel engine is supplemental to other sources of prime power. Considerable attention has been given to the interconnection of Diesel plants with steam stations on large interconnected systems, but the small electric utility system utilizing more than one type of prime mover is somewhat of a rarity.

The successful combination of Diesel and hydro prime movers has produced very economical power for the municipal electric utility at Radford, Virginia. Operating records of this system ably illustrate how hydro and Diesel-driven equipment can be arranged to aid each other.

Radford is a terminal point on the Norfolk and Western Railway, approximately 40 miles west of Roanoke in western Virginia. The surrounding country is rolling, and agriculture and stock raising are the principal occupations. A pipe foundry, knitting mills, and other manufacturing activity add to the general prosperity of the community in addition to the railroad activities centering in Radford. Virginia Poly-

* Associate Engineer, Burns & McDonnell Engineering Company.

STUDY OF COMBINATION DIESEL-HYDRO PLANT

By GLENN C. BOYER *

technic Institute, one of the leading technical schools in the United States, is located at Blacksburg, approximately 12 miles from Radford. Some 30 years ago the City of Radford purchased a locally-owned utility property consisting of a small hydro-electric plant, electric distribution system in the city, and a street railway system. Like most small electric street railway systems, this one was eventually abandoned, but in its place the city operates a fleet of busses for mass transportation in the community.

The electric load has outgrown the capacity of

the original hydro plant by 1930, and in order to keep pace with the demand for electricity, a Diesel plant consisting of two 300 kw. and one 175 kw. units was put into operation that year at the city's waterworks to supplement the hydro installation. Further load increases, coupled with the fact that the available hydro capacity had not been fully utilized, led to the construction of a new hydro plant of 800 kw. capacity in 1934 and the abandonment of the old station obtained through the original purchase of the utility property.

This new hydro plant was soon loaded to capac-

ity, and in 1938 a fourth Diesel engine unit of 590 kw. was installed. Following this in 1941, an 800 kw. unit was added to the Diesel plant. Thus, in a period of 11 years, two plants having installed generating capacity of 2,965 kw. were constructed by the city to accommodate its rapidly expanding electrical load.

The Norfolk and Western Railway operates a small steam generating station in Radford and connections are maintained between the city system and the railroad for interchange of power whenever it might become necessary.

The operating record of this municipal installation is interesting because, while the total electrical energy production practically doubled in the six-year period 1938-1943 inclusive, the amount of energy delivered to the system by the hydro plant remained relatively constant. As a consequence, the Diesel plant was called upon to deliver the additional energy needed by the system. The division of load between the two plants is shown by Table 1.

Table 1—Energy Production by Hydro and Diesel Plants:

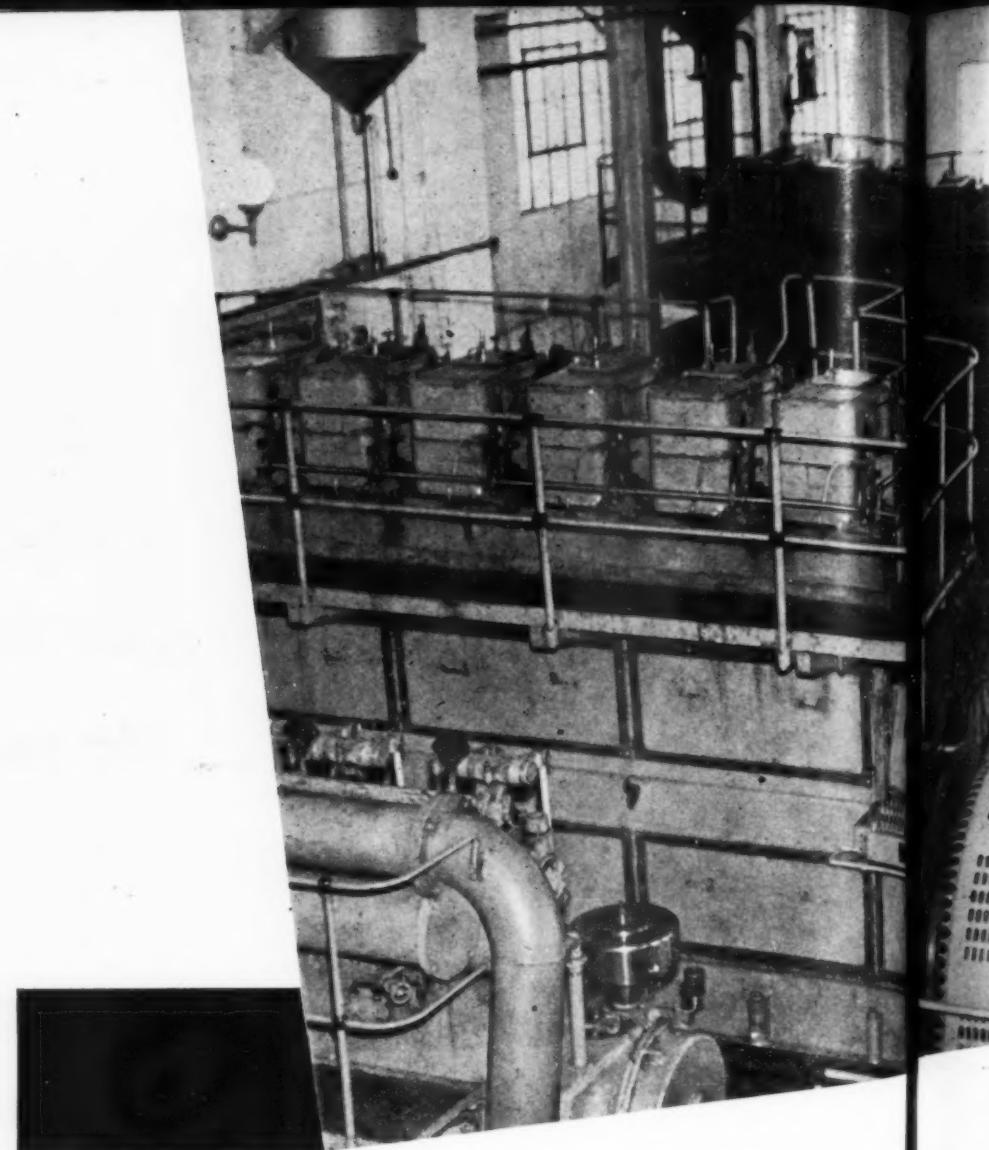
Year	Energy Generation (kwh)			Percent Generation	
	Hydro	Diesel	Total	Hydro	Diesel
1938	4,813,700	1,889,200	6,702,900	71.8	28.2
1939	5,336,400	2,370,740	7,707,140	69.2	30.8
1940	5,798,000	2,362,300	8,160,300	71.1	28.9
1941	4,135,000	7,257,800	11,392,800	36.1	63.9
1942	3,868,000	8,257,100	12,125,100	31.9	68.1
1943*	4,633,200	6,667,700	11,310,900	40.9	59.1

* 1943 data for first 11 months only.

Water for production of hydro-electric power is taken from Little River just above its point of confluence with New River, approximately 2½ miles from Radford. A reinforced concrete dam creates a storage reservoir approximately 4 miles long on Little River. Due to the relatively steepness of the river valley banks, the available storage in this basin is not great, and as a result, the hydro plant must be operated primarily on the available stream flow. Due to the character of the electric load in the community, and the capacity of the Diesel generating equipment available, it is possible to run this hydro plant so as to take full advantage of the water available in the stream except during periods of flood flow when storage is not available for the excess water.

Records covering 71 months of operation of the hydro plant show the average monthly generation to be 402,600 kwh. with a range of from 591,400 kwh. maximum to 146,300 kwh. minimum.

This hydro installation contains a single Kaplan-type hydraulic turbine designed to oper-



Diesel units No. 4 and 5, Alco engines of 860 hp. and 1,170 hp. respectively.

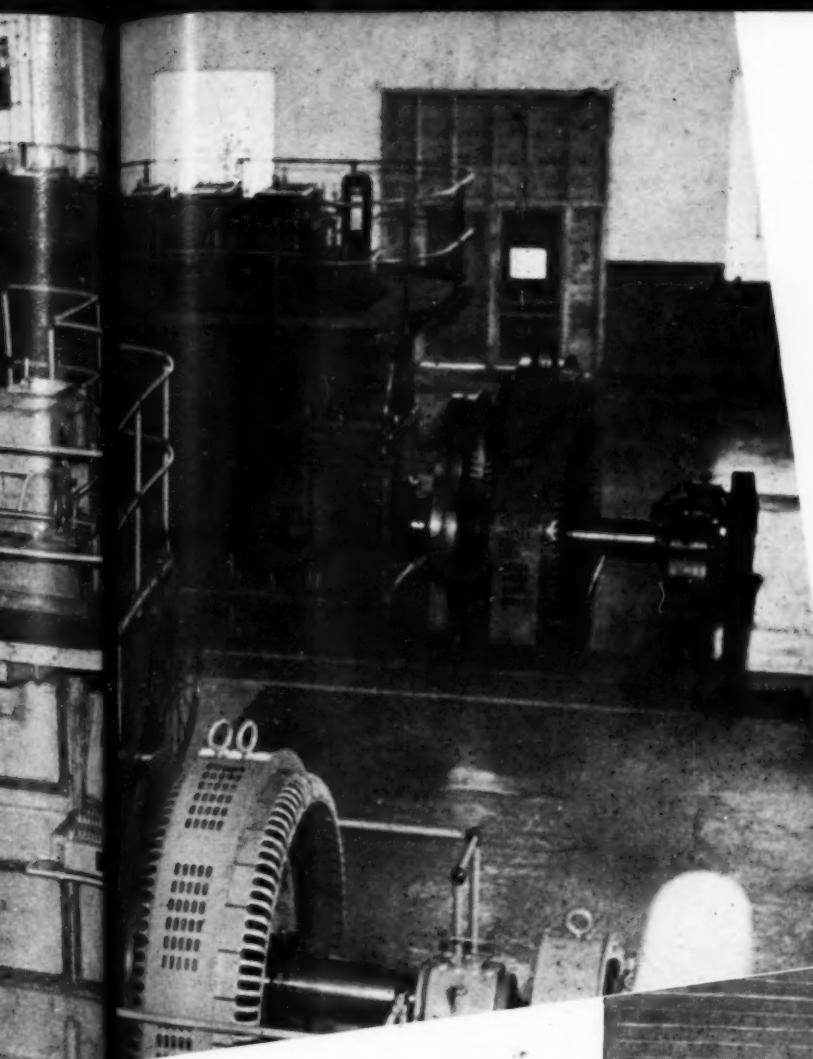
ate with heads varying from 40 to 27 feet. Although the capacity of the generator is 800 kw. at 80% power factor, this station consistently carries loads of from 925 to 975 kw. at 90% power factor. Remote control of this station is effected from the Diesel plant, and as a consequence, no operator is in attendance at the hydro generating plant. Maintenance men make periodical trips to the hydro-electric station for inspection and test, but the operation is by remote control.

The initial installation of three units in the Diesel plant consisted of De La Vergne engines. The smallest unit is a four-cylinder, four-stroke-cycle, unit of 270 bhp. operating at 300 rpm. and a generator rated 175 kw. at 80% power factor. The two larger units are both six-cylinder, four-stroke-cycle units of 410 bhp. capacity

driving 300 kw. generators at 300 rpm.

When the fourth unit was installed in 1938, a McIntosh-Seymour unit rated 860 hp. was purchased. This is a six-cylinder, four-stroke-cycle, 17½ x 25-in., 257 rpm. unit driving a 590 kw. generator at 257 rpm.

The unit installed in 1941 is an Alco Diesel rated 1,170 bhp. and equipped with an 800 kw. generator. This is an eight-cylinder, four-stroke-cycle, 17½ x 25-in., 257 rpm. unit and is designed for supercharging. It is the plan to install the supercharger on this machine as soon as it can be secured. The generator, while rated at 800 kw. is designed for additional capacity and will be satisfactory for the supercharged engine when it is decided to add supercharging equipment to the engine.



Hydro-electric turbine and control for variable pitch turbine runner.

rpm.

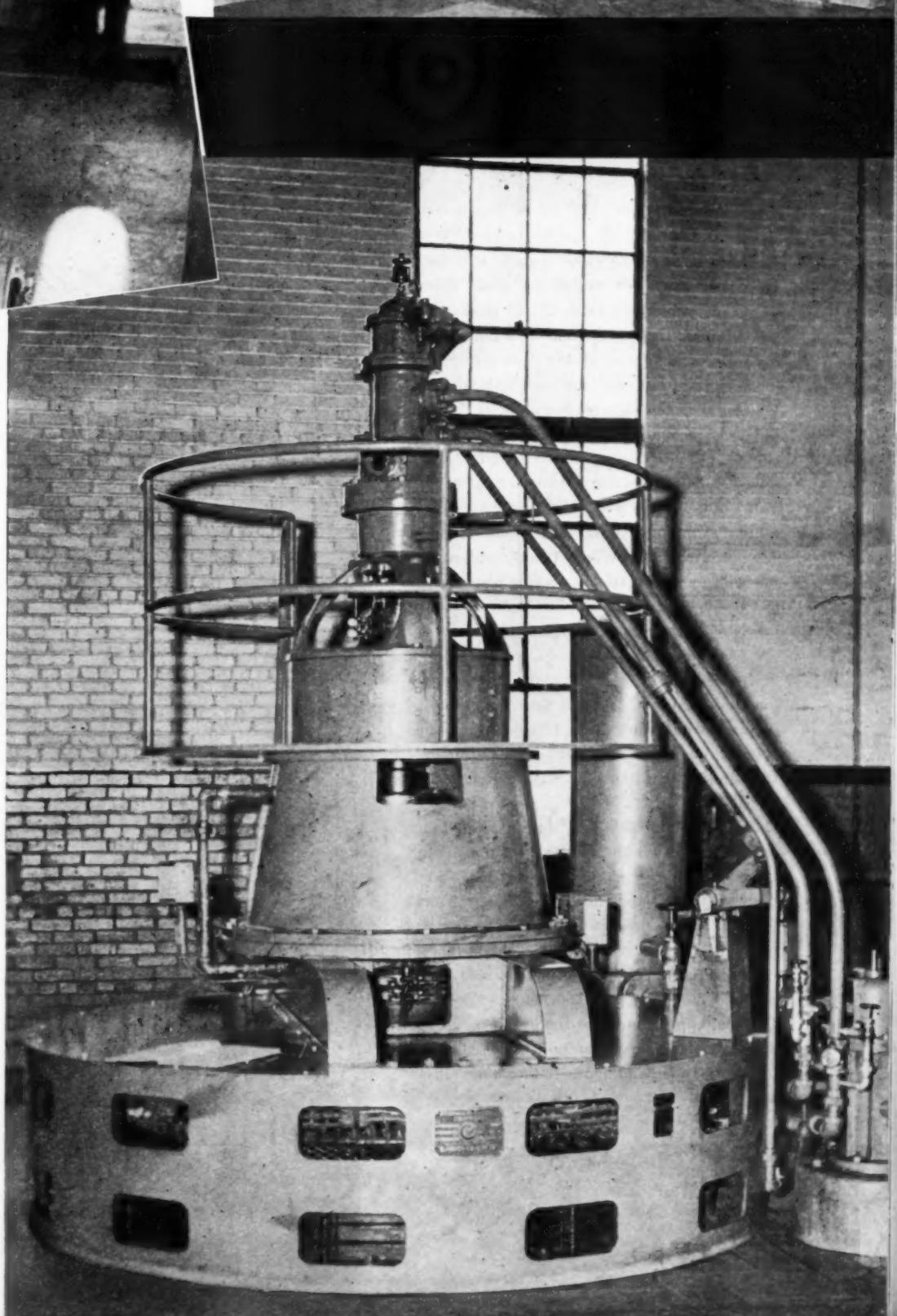
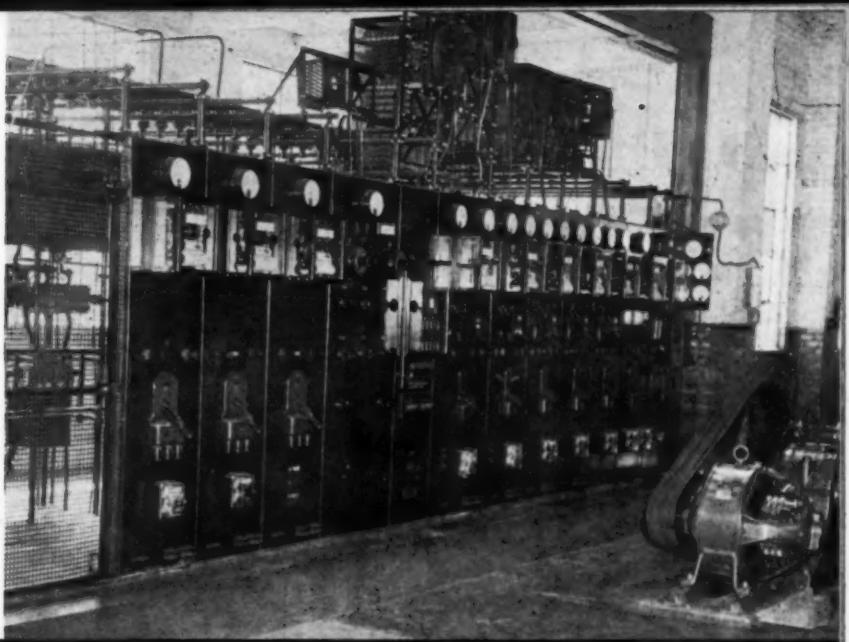
in 1938, a
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ing a 590 kw.

Electrical energy production for the six-year period 1938-1943 inclusive has averaged 12.08 kwh. per gallon of fuel oil consumed, and has ranged from 12.48 kwh. per gallon as a yearly maximum to 11.30 as a yearly minimum during this period.

Alco Diesel
an 800 kw.
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Since the Diesel plant is constructed adjacent to the city's waterworks, the two plants are operated with a common staff. This reduces the number of men required for each utility, and ensures continuous attendance at the waterworks filtration plant.

The installation at Radford illustrates what can be done to take advantage of available hydro power in conjunction with a Diesel installation to produce low-cost power for the community.



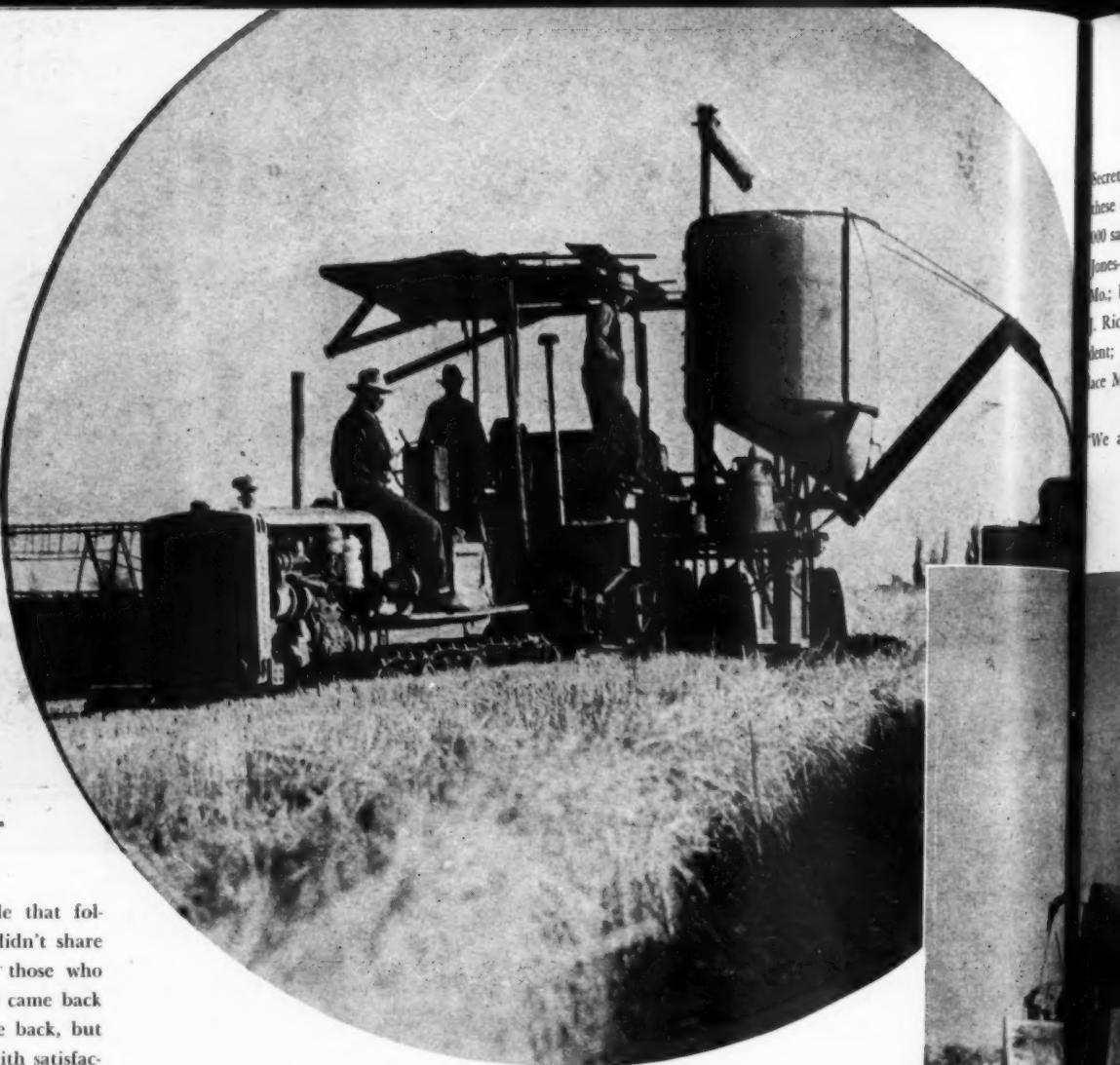
DIESELS PULLING SUTTER BASIN OUT OF RED

By F. HAL HIGGINS

REMEMBER the farm debacle that followed World War I? But if you didn't share in it, you can't appreciate it like those who went through the wringer and then came back from the depths. Many didn't come back, but those who did can now look back with satisfaction on their foresight and courage in facing the facts of war deflation and adopting machines and methods to cut costs and restore solvency. Sutter Basin in the famed Sacramento Valley of California is one of the prime examples of this evolution. It was one of the famous Armour projects in World War I, and when war ended and that famous packing house head found himself out on a war limb that was sawed off with wholesale cancellation of meat contracts, his empire broke up as time relentlessly took its toll in his "million-dollars-a-day-for-100-days" losses. Sutter Basin was just starting its development then. It has since been going through reorganization, development for rice, and grain farming, and sale to farmers.

One little group of brainy, shrewd farmers in this Sutter Basin is known today as Sutter Basin Growers Cooperative. So successful have they been in getting mechanized via Diesel tractors for efficient production of rice, beans and small grain that they have just completed the finest rice-bean-grain drier-elevator in California. The picture shows the \$380,000 building as the Diesel-equipped contractor completes the filling and leveling operations around its foundations in time for the handling of the members' 1944 crops.

Above: This Diesel tractor-pulled combine harvester stops to unload its storage tank as truck pulls alongside. Below: A fleet of Caterpillar Diesel graders cleaning up on completion of the finest rice, bean and grain drier-elevator in the West.



Secretary-Treasurer W. J. Duffy, Jr., sets down these facts about their drier-elevator: Size, 200,000 sacks capacity; drier, Randolph; contractor, Jones-Hettelsater Construction Co., Kansas City, Mo.; built 1943; cost, \$380,000; officers, Adam Richter, president; Frank Lamb, vice-president; W. J. Duffy, Jr., secretary-treasurer; Wallace McWilliam, Manager.

We are equipped to handle beans in bulk,

recleaning and storing," says Mr. Duffy. "Also rice, wheat, barley, milo, peas, and practically all of the crops of our eleven members. Our 11 members comprise 22 individuals, some members being partners. Our rice crop alone will produce 250,000 bags, but we will not be using bags. No human hand touches the crop from sowing by plane to the sacked milled product. By the obsolete sack method, I figure we used to lift each sack from 10 to 15 times by hand,

only one of the many advantages of our modern drier-elevator plant that handles the crop direct from the Diesel tractor-pulled combines."

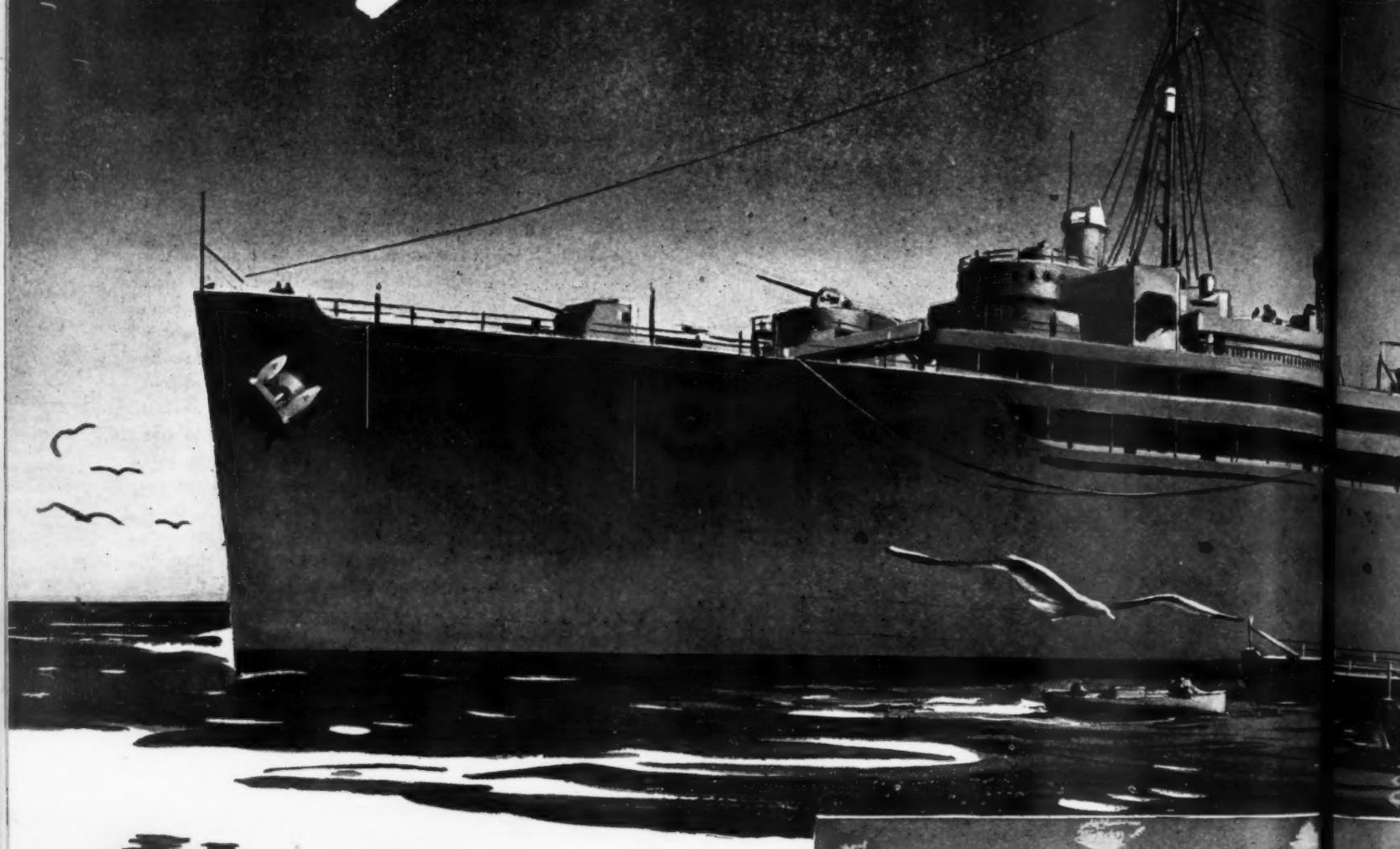
Your old reporter caught President Adam Richter, one of the Basin's most progressive farmers, at the new drier in a conference with Secretary Duffy, Vice President Lamb, Engineer Von Geldorn, Yuba City; and Contractor Hettelsater from Kansas City. Knowing this area was all-crawler tractor, specially on rice, and that every farmer owned a fleet of such power for plowing, irrigation and reclamation, harvesting, etc., he asked President Richter to state what part Diesels play in their farming operations.

"Well, every one of the eleven members of this Sutter Basin Co-op owns Diesel crawler tractors," he replied, as he ran over the list mentally. Most of them are Caterpillars, with some Internationals, and at least one Allis-Chalmers and one Cletrac. We couldn't farm without Diesel track-type tractors; they helped pull us out of the depression by cutting costs so drastically, you know." Some of these growers have as many as four Diesel tractors and would buy more. The rice and grain is hauled by Diesel trucks from drier to mills in many instances, though railroad tracks will be laid to the drier-elevator as soon as the fill is completed.

This dirt-moving-filling-leveling job is a Caterpillar Diesel job, by the way. H. Earl Parker of Marysville, Calif., is the contractor, who is moving some 12,000 yards of dirt from across the Sacramento river, about a mile and a half And now please turn to page 82



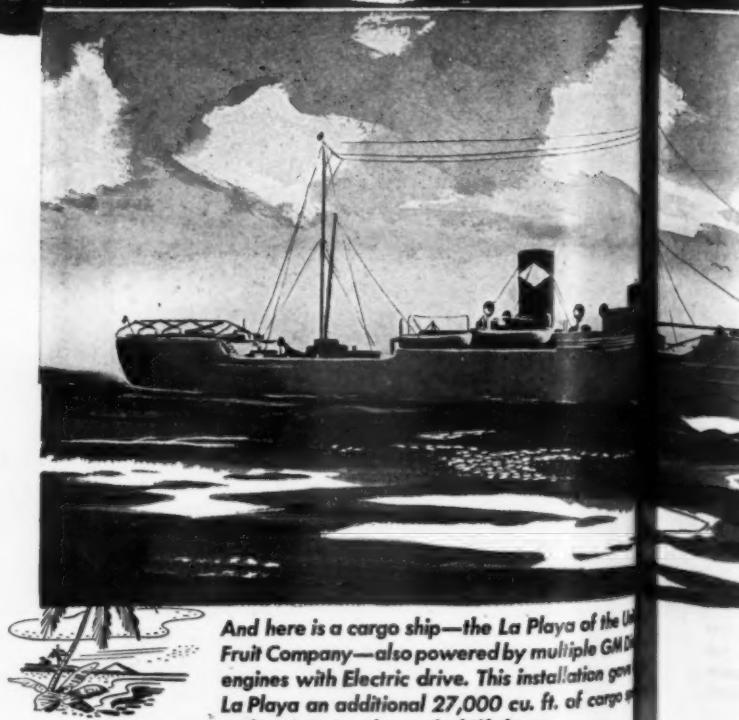
12,000 H.P.



Here you see the "Fulton." She's one of a fleet of seven U.S. Submarine Tenders—"mother" ships where roving subs stock up—veritable floating machine shops.

These 16,000-ton ships are powered by multiple Diesel-Electric drive units and are among the highest powered Diesel warships yet built. Each has 12,000 horsepower.

This dependable power is supplied by eight General Motors 2-cycle Diesel engines—the kind you find in Navy vessels of 40 different types.



And here is a cargo ship—the La Playa of the U.S. Fruit Company—also powered by multiple GM Diesel engines with Electric drive. This installation gave La Playa an additional 27,000 cu. ft. of cargo and an increased speed of 1½ knots.

Diesel-Electric

KEEP AMERICA STRONG
BUY WAR BONDS



ENGINES...150 to 2000 H.P. CLEVELAND DIESEL ENGINE DIVISION, Cleveland 11, O.

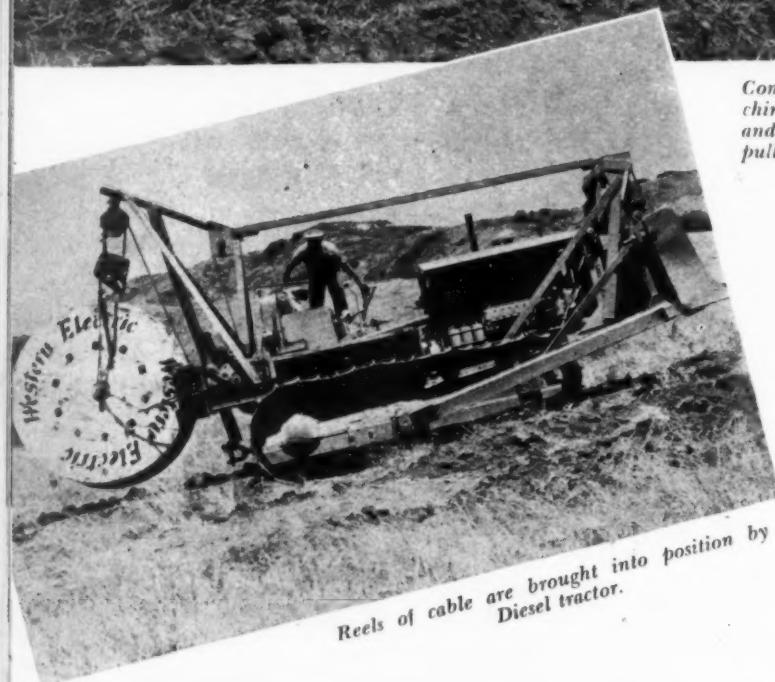
ENGINES.....15 to 250 H.P. DETROIT DIESEL ENGINE DIVISION, Detroit 23, Mich.

LOCOMOTIVES..... ELECTRO-MOTIVE DIVISION, La Grange, Ill.

DIESEL
POWER



Combination rooter plow and deep cable-laying machine. It weighs 30,000 lbs., digs to a depth of 7 ft., and lays cable as it digs; a Caterpillar Diesel tractor pulls the brute.



Reels of cable are brought into position by a Diesel tractor.

UNDERGROUND THROUGH THREE COUNTIES

By JIM MEDFORD



Here's the parade; two Diesel tractors pulling plow and cable trailer, followed by another Diesel tractor, pushing in reverse with a dozer leveling the land.

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April 1943
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Cable crew removes an empty cable reel. The tractor will pull a full reel into place and go on.

It was done because the Post Boys that run a garage near Santa Ana, the county seat, never learned the meaning of the word "NO." The ranchers wanted something, these Post Brothers build it. That's what they're there for, to build things that shop keepers don't stock on their shelves. So, they get their name in the newspapers for the people to read.

One of these readers was a big telephone man over in the next county west. And at once he got downright interested in that big spade by Post (namesake of Emily, but different). That was because he had a smart mess of plowing to do—better'n a hundred miles. He put a pint of gas in the Austin, rambled over to Bolsa and laid his plowing problem before these Post fellows.

Now, Norm, the elder Post, is a rugged sort of a chap; not much given to talk. But a good listener. He just cocked an ear while the Telephoner reeled off his needs. Then, casual like, Norm reached around behind him from where he was sitting in the sun in the garage door, fished out a clean Redwood shingle, sharpened his pencil stub with a hand chisel, wet the pencil point and went to work creating. The Telephoner watched over Norm's shoulder, his eyebrows going up and down. Then, he nodded his head as Norm laid the shingle on his knee. "Build it!" That's all the Telephoner said.

up of the behemoth. The apparatus on its oil to the cable at 50 lbs. pressure to the friction.

EVER Bolsa way, where the biggest danged plow in captivity we told you about in the April 1943 issue of DIESEL PROGRESS came into existence because the "upside-down" (they run that way in California) Santa Ana River went out of bounds and plastered sand all over the ranchers' back forties, is in the news again.

You'll remember that time it was because these ranchers had to get that good black soil back in the sun. You just can't grow oranges, truck stuff or families on sterile river sand. Not even in Orange County where they don't need a publicity man to convince the growers they're living in the original home of Adam and Eve. So, they got themselves the 15,000-pound, six-foot furrow plow to up that good growing soil, turning the sand under for good drainage.

Norm called his brother, Hap, and showed him the shingle sketch. Hap grinned and called the blacksmith. The blacksmith took one look and called the helper. They were organized and that roadside garage became the busiest car barn in Southern California. The Telephoner said he was in a hurry, and for some days that place hummed and clanged. And to the kids on their way home from taking on education, a peek through the garage door was like taking a gander at something Superman was cooking up for the Nips.

A bit later the good bean growers in the flat country back some distance from the Mission were startled one morning (the sun WAS shining) at the flurry in the distant patches of growth along the *arroyos*. They'd been reading in the morning edition about the new B-29 and the German's flying torpedo. Could they have met there in the dry wash?

And then "it" racketed up out of the bottoms and snaked across the side hill. Ahead were five D-8 tracklayers from Mr. Caterpillar's Diesel herd dragging a behemoth that was a cross between a scaffold for Joe Mufray, Bunyan's rival, and a wartank retrieving unit. Its size was fearsome and it was equipped with a six-foot cutting digger that was ripping up the soil as though it was soft cheese. It passed. Then came another outfit, two D-8's ahead, a Roman chariot sort-of-a-thing with a big reel of cable on its rear and another D-8 rumping in along and dragging its dozer in the rear to cover up scar the leading bunch had torn in the face of the land.

Moving in closer, which took courage, the watchers discovered a Dieselize cable-laying rig that was putting down a new multiple-circuit line between the City of the Angels and the Harbor of the Sun (San Diego), so the Boots at the Naval Training Base could talk to Mom back home without using up all their "liberty" waiting outside a phone booth.

The cost to put one of these Caterpillars over the landscape? Almost overlooked that, it's SO trifling. Per each of these Diesel mules per one hour, it's the equivalent of what you plunk into the gas meter (some of you), two bits or the quarter of a dollar.

Of course, the mules need a bit of oil. But when you add it all up, you get something like this—Some air, some water, some hydrocarbons, to make the Caterpillar go. The same, jumbled a little in a laboratory, gives out—Your Lady's precious Nylon Hose!

tractors
er, fol-
tractor,
r level-

Inspection,

Servicing and Running

Repairs

By CHAS. F. A. MANN

Editor's Note: In the June issue of DIESEL PROGRESS Part II of Mr. Mann's series of articles on the Denver and Rio Grande Western Diesel-electric operation was published. Because of its sheer bulk and segmental interest we omitted the Inspection and Servicing Routine with a promise to publish it if a sufficient number of individuals so requested. Railroadmen and others all over the country asked for this part of the story so here it is.

IN ARRIVAL at Burnham, following completion of round trip, the locomotive is moved from "tie-up" track by hostler to either the outside fueling station, or directly into Diesel service shop where fuel facilities are also provided. Any exterior cleaning of Diesel freight locomotives, either car body or trucks, is performed by a labor gang assigned to this work. The frequency of such cleaning is determined by the general appearance of the locomotive. Interior cleaning of cabs and locomotive engine rooms is performed by a labor gang assigned to Diesel maintenance forces for this work. Cabs and locomotive glass, both exterior and interior, are cleaned each trip. Diesel engines and engine room floors are cleaned every trip; however, certain heavier types of cleaning involving engine room assemblies, engine room walls, ceilings, etc., is done as necessity requires. Locomotive is fueled by storehouse personnel and sanded by laborers assigned to Diesel service forces. Immediately following locomotive arrival, engine lubricating oil samples that have been taken from each Diesel engine by the TDEM (Traveling Diesel Electric Maintenance) prior to arrival at Burnham are delivered to the laboratory. Here analysis is made for viscosity, flash point and other characteristics relative to lube oil condition and engine safety. An unfavorable report from the laboratory will indicate faulty injector operation, leaking fuel oil lines, or other engine conditions. Thus, shortly after locomotive arrival at

Burnham, the Diesel maintenance foreman is provided with information that will enable him to make early plans to correct any out of line conditions before locomotive departure.

Diesel maintenance foreman or lead man boards the locomotive on arrival at Burnham and takes from the locomotive Diesel Locomotive Trip Report, Form 3417 rev. and Engineers' Work Reports. Listed on the Trip Report are the routine maintenance and inspection operations due on that particular locomotive round trip. Also, the TDEM have written into the spaces provided on the Trip Report, a log of the work they performed during the trip, any materials needed, repairs found necessary while making their inspections. From this information on the Trip Report, Engineers' Work Reports, and from his own personal inspection of the locomotive, the Diesel Maintenance Foreman or Lead Man prepared Form Diesel Freight Locomotive Terminal Maintenance Record. Procedures relative to this form are noted elsewhere in this Manual. On the Terminal Maintenance Record are listed all the inspection and service operations to be performed by Terminal Maintenance Forces while the locomotive is in the Burnham service shop prior to departure on next round trip. The various operations are assigned to the members of the Diesel Maintenance Force who are to perform the work. Following completion of their assigned tasks, the persons doing the work place their initials after the completed item on the Terminal Maintenance Record.

Routine maintenance and inspection operations are grouped into five general classifications: Mechanical Operations, Electrical Operations, Air Appliance Operations, Pipe-Sheet Metal Operations, and Miscellaneous Operations. Machinists, electricians, pipe-sheet metal

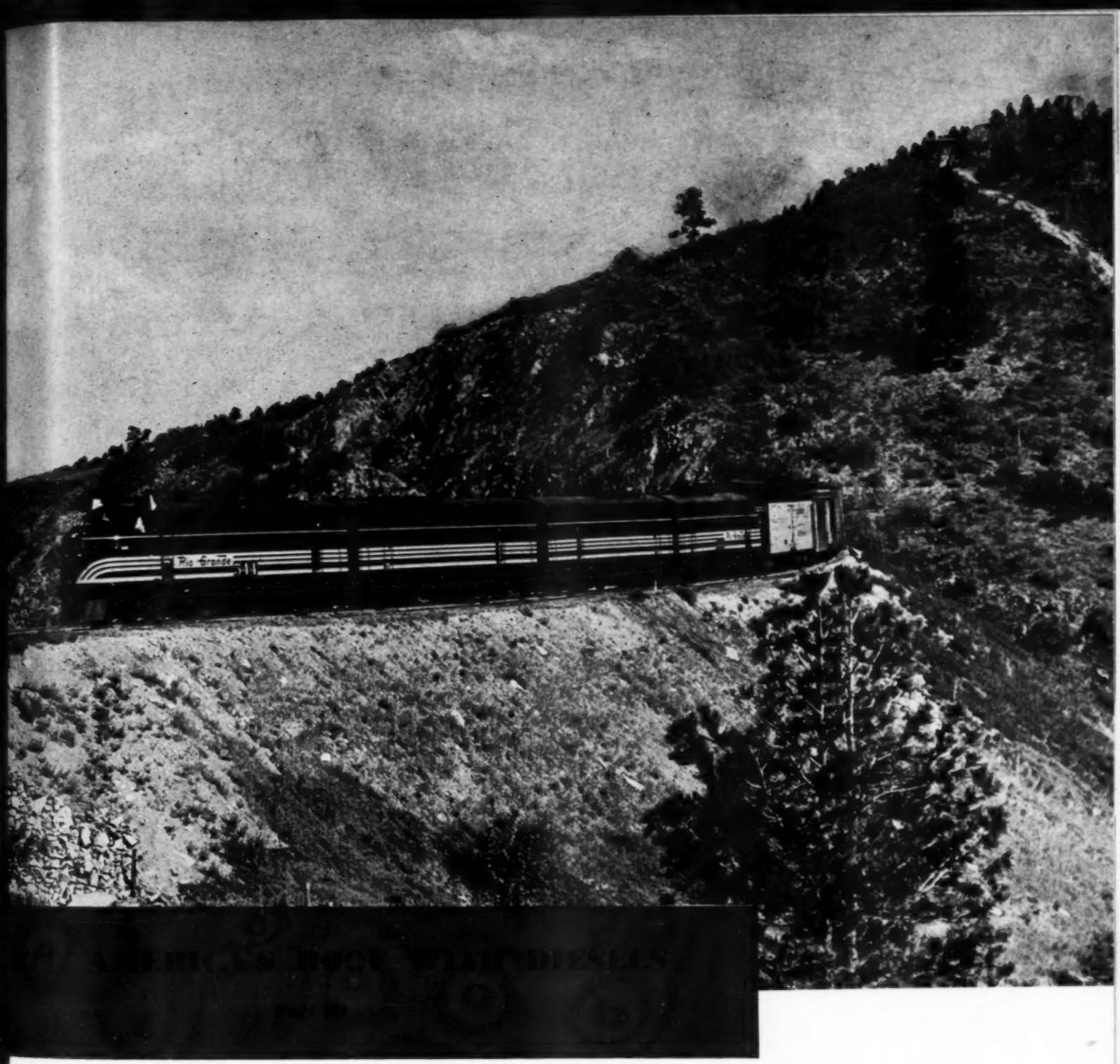


workers, and their helpers, and the laborers are assigned their respective duties from the above classified operations.

Upon completion of all work assigned, the Diesel Maintenance Foreman or Lead Man makes a thorough inspection of the locomotive, then notifies the Engine Dispatcher as to the time when the locomotive will be available for call.

During the performance of maintenance operations, if any part or assembly of the locomotive is changed out, such part or assembly carrying a manufacturer's serial number, a record is

made of the card. The card is noted, etc. The record file is Diesel sup. The card of all showing p. number, d. in engine that posit. and service whether p. ice, is in shop unde



made of this change on Form 3548, Parts Record Card. Procedures relative to this form are noted elsewhere in this Manual. This parts record file is maintained in the office of the Diesel supervisor and provides a complete record of all serial numbered parts and assemblies, showing part numbers and description, serial number, dates removed and applied, position in engine or locomotive, mileage accrued in that position and total mileage accumulated, and service mileage remaining in part, also whether part or assembly is operating in service, is in store stock, or is in Diesel service shop undergoing reconditioning.

SALT LAKE CITY—Inspections and Service Operations

At Salt Lake City, locomotive fuel tanks are filled to capacity, engine lubricating oil supply is brought to capacity in each Diesel engine, and spare lubricating oil supply cans filled. All brake shoes are inspected and necessary replacements made. Brake cylinder travel is set to proper dimension. Engine cooling water systems are filled to capacity and auxiliary water tanks supplied. A general exterior and interior inspection of locomotive is made.

GRAND JUNCTION—Inspections and Service Operations

At Grand Junction, on both eastward and westward movements, locomotive fuel oil supply is checked by the TDEM and if necessary, supply is brought up to minimums set up for the respective directions of departure by the Diesel supervisor. Lubricating oil supplies are checked and replenished if necessary. Engine cooling water systems are filled and auxiliary water tanks supplied if necessary. A general check of the interior and exterior of the locomotive is made by the TDEM on arrival and departure.

DIESEL FREIGHT LOCOMOTIVES—MAINTENANCE AND INSPECTION OPERATIONS—MASTER SCHEDULE

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E.M.C. DIESEL
MECHANICAL OPERATIONS
TECH. REPORTS, DELAY REPORTS, ETC.
SHARE MATERIALS, ETC.

REC. TAPES, TRIP SHEETS, FUEL REPORTS, DELAY REPORTS, ETC.
CHECK SUPPLIES: BAGS, BOLS, KNUCKLES, SPARE MATERIALS, ETC.
INSPECTIONS DUE THIS TRIP.
CHECK ENGINE LUBE-OIL LEVELS.
TAKE SAMPLES OF LUBE-OIL.
CHANGE ENGINE AIR FILTERS.
INSPECT UPPER CYLINDER MECHANISM.
INSPECT AIR BOX, PISTONS, RINGS.
INSPECT CRANKCASE MECHANISM.
CHECK THE GEARINGS FOR LUBRICANT.
CHANGE MICHIGAN FILTERS.
DRAIN PURULATORS, FUEL TANK SURPS.
CHECK ALL BELTS - CONDITION AND TENSION.
SWITCH DUPLEX - CHANGE DUPLEX, FULL-FLO, PURULATOR FIL.
CHECK OPERATION LOW OIL PRESSURE SWITCHES.
CHECK INJECTOR TIMING AND VALVE LASH.
CHECK OVER-SPEED TRIP OPERATION.
TIGHTEN CYL STUDS AND CRAB NUTS.
CLEAN AIR BOXES.
TIGHTEN ALL EXHAUST STACK BOLTS.
CLEAN CRANKCASE BREATHER.
FILL WATER PUMP OIL CUPS - ENGIN. OIL.
LUBRICATE GOVERNOR, IND. RACK, SHUTTER LINKAGE.
LUBRICATE TRUCK CENTER BEARINGS.
LUBRICATE COOLING FANS AND IDLERS.
LUBRICATE ACCESS END FAN CLUTCH, PINS, ROLLERS, THROW-OUT BEARING.
FAN CLUTCH, PINS, ROLLERS, THROW-OUT BEARING.
CLEAN OUTSIDE OF FUEL OIL TANKS.
CHECK OIL LEVEL 90° FAN DRIVE.
LUBRICATE TRACTION MOTOR GEARS.
CHECK INJECTOR RACKS, PILOT VALVE, GOVERNOR LINKAGE.
CHECK FAIR CLUTCH OPERATION, ADJUST CLUTCHES.
CHECK EMERGENCY FUEL CUT-OFF OPERATION.
TIGHTEN TRACTION MOTOR AXLE BEARING CAP BOLTS.
LUBRICATE TM BLOWER BEARINGS - ADD ONE SHOT.
LUBRICATE BRAKE BLOWER BEARINGS - ADD ONE SHOT.
LUBRICATE ALL FAN COUPLINGS, BRAKE BLOWER, COMP., FAN DRIVE.
DRAIN AND REFILL ENGINE GOVERNORS.
CHANGE OIL IN 90° FAN DRIVE.
CHANGE ENGINE OIL - CLEAN AND FLUSH LUBE OIL SYSTEM.
TIGHTEN ALL ENGINE AND ASSEMBLY MOUNTING BOLTS.
INSPECT TRACTION MOTOR GEARS.
CHECK CALIBRATION, LOW SWITCHES, OIL PRESSURE GAU.
TIGHTEN OIL COOLER CORES.
FILL SHOCK ABSORBERS.
CLEAR OIL SEPARATOR FILTERS.
FLUSH ENGINE GOVERNORS.
CALIBRATE SPEED RECORDERS.
REMOVE AND INSPECT ENGINE CO. ROD BEARINGS.
CHECK MAIN GEN. COMPRESSOR, FAN DRIVE, ALIGN.
CHECK TRUCKS FOR WEAR.
CHANGE INJECTOR FUEL FILTERS.
REMOVE AND CLEAN OIL COOLER ELEMENTS.
ETC. ENGINE RECONDITIONING.

ELECTRICAL OPERATIONS

AIR APPLIANCE OPERATIONS

SIDE-SHEET-METAL OPERATIONS

129 INSPECTION &
130 RECONDITION AIR
PIPE-SHEET-METAL OPERATOR
35 CHECK ENGINE PIPE AND SHEET METAL SUPPLIES.
36 FILL ALL ENGINE COOLING SYSTEMS.
37 FILL AUXILIARY AND SERVICE WATER TANKS.
38 CHANGE ENGINE ROOM SIDE FILTERS.
39 CHECK COOLING SYSTEM HOSES, PIPES, PUMPS, GAUGES, BLOW RADIATORS
40 CHECKING HOT ENG. ALARMS, WATER TEMP & PRESSURE GAUGES
41 COOLING SYSTEM.

MISCELLANEOUS OPERATIONS

MISCELLANEOUS

145 FILL ALL LOCOMOTIVE FUEL TANKS.
146 FILL ALL ENGINE SAND BOXES.
147 FILL ALL ENGINE OIL AND LUBRICATING OIL.
148 CLEAN CARB. FLOORS AND WINDOWS.
149 CLEAN ALL LOCOMOTIVE GLASS - EXTERIOR AND INTERIOR.
150 CLEAN ENGINE ROOM WALLS, FLOORS, ASSEMBLIES.
151 CHECK JOURNAL BOX OIL LEVEL.
152 INSPECT AND SERVICE FIRE EXTINGUISHERS.
153 INSPECT AND SERVICE FIRE EXTINGUISHERS.
154 LUBRICATE VESTIBULE DIAPHRAGM ASSEMBLY.
155 LUBRICATE FIXED COUPLERS - REAR COUPLER IN FRONT B.
156 LUBRICATE COUPLED PARTS AND PIN LIFTING LINKAGE.
157 LUBRICATE DOOR AND WINDOW HARDWARE.
158 FILL ALL JOURNAL BOXES.

This large checking sheet titled in full, "Diesel Freight Locomotive Maintenance and Inspection Operations Master Schedule" carries 156 items covering inspection and maintenance of every last detail on the locomotive.

The Maintenance and Inspection Operations-Master Schedule is laid out on a 30 in. x 60 in. white-print. A copy is reproduced herewith. On this sheet are noted all routine maintenance and inspection operations, these operations being listed under five groupings down the left side of the sheet. These groupings are, Mechanical Operations, Electrical Operations, Air Appliance Operations, Pipe-Sheet Metal Operations and Miscellaneous Operations. A total of 140 operations are listed. To the right of this list, the sheet is divided into 150 spaces or trips. Although the actual round-trip mileage to Salt Lake City is 1150, for the sake of simplicity of setting up maintenance intervals, a round-trip is considered as 1000 miles. Across the sheet to the right of the operation, at the correct mileage intervals, are noted by locomotive quarters involved, the routine Maintenance and Inspection Operations. Locomotive Quarters are designated 1, 2, 3 and 4, all letter "A." Thus, for example, Maintenance Operation 15, Check Injector Timing and Valve Lash, is to be performed every 12,000 miles or by our schedule every twelve round-trips. Since this operation requires considerable time, two quarters of the locomotive are worked one trip and the other two quarters the following trip. So, on our Master Schedule we find following Maintenance Operation 15, under trip 1, quarters 1 and 2 due for this operation, while quarters 3 and 4 are due on trip 2. Then after twelve round trips or 12,000 miles, we find this operation due again as follows: quarters 1 and 2 on trip 13 and quarters 3 and 4 on trip 14.

We find that there are about 15 operations due every 12,000 miles. Instead of listing all these operations as due the same trip, we spread these 12,000 mile operations over the intervening trips as evenly as possible so that on each trip we try to have come due an equal number of man hours of routine Maintenance and Service Operations. All operations are thus spread and listed according to their frequency, so that on any one trip we will have, say, 30 or 35 of the 122 operations listed coming due, thus spreading our routine maintenance work evenly, and eliminating the necessity of holding the locomotive an excessive amount of time following any one trip in order to perform routine maintenance and inspection operations.

MASTER SCHEDULE MOUNTED UNDER GLASS

This Master Schedule is mounted under glass in the Diesel service shop. The operations list is mounted on a sliding panel that travels horizontally across the schedule. In this sliding panel is a vertical window wide enough so that three trips are visible. An arrow at the top cen-

ter of the window clearly indicates the trip in question. Thus, when the sliding panel is in position to indicate for example, trip 17, it is easy to follow down the window under the arrow and note the Maintenance and Inspection Operations due on trip 17, as indicated by quarter designations in the squares following the operations list and under trip 17, and transfer these operations due on to the Locomotive Trip Report, for, 3417 rev. so as to outline the work to be performed on the locomotive during and following that particular round-trip.

As an illustration, prior to departure of the locomotive on trip 104, the Diesel maintenance foreman would prepare Form 3417 rev. for the locomotive involved and for trip 104. Under column for trip 104 we find the following operations due, these operations to be performed enroute by the TDEM and following return of the locomotive to Burnham, this completing trip 104.

OPERATIONS DUE ON TRIP 104 MECHANICAL OPERATIONS

Oper. No.	Quarters Involved
1. Rec. Tapes, Trip Sheets, Fuel Reports, Delay Reports, etc.	A
2. Check supplies, oils, knuckles, rags, spare materials	A
3. Inspections due this trip	1
4. Check engine lube oil levels	A
5. Change engine air filters	3-4
6. Inspect upper cylinder mechanism	3-4
7. Inspect air box, pistons, rings	3-4
8. Inspect crankcase mechanism	3-4
9. Check TM gears for lubricant	3-4
10. Change Michiana filters	4
18. Clean air boxes	3-4
27. Lubricate TM gears	3-4
30. Check emergency fuel cut-off operation	A
31. Lubricate TM blower bearings— add 1 shot	A
32. Lubricate brake blower bearings— add 1 shot	A

ELECTRICAL OPERATIONS

59. Check all lite bulbs	A
60. Check engine electrical supplies	A
61. Inspect trac. motor & main gen. brushes	3-2
62. Lubricate TM axle bearings	A
63. Check battery water level and gravity	4
65. Inspect, clean and blow TM, main and aux. gen.	3-2
67. Check hi-low voltage circuits for grounds	3-2
80. Lubricate reverser drums— petroleum jelly	3-2
81. Lubricate link brgs., con. rods of C switch, start cont., TM cont.	3-2
89. Lubricate reverser brgs., and gear rack	3-2

91. Lubricate TM, M, reverser, cam switch air engines	3.2
AIR APPLIANCE OPERATIONS	
100. Check air appliance supplies	A
101. Check all brake shoes, brake rigging	A
102. Set all brake cylinder travel to 2 in.	A
103. Check operation all air appliances— locomotive departure	A
104. Drain comp. intercooler and main res.	A
105. Drain control air filters	3.4
106. Check comp. lube oil level and lube oil pressure	3.4
110. Drain and refill air comp. lube oil	3
PIPE-SHEET METAL OPERATIONS	
124. Check engine pipe-sheet metal supplies	A
125. Fill engine cooling systems	A
126. Fill aux. and service water tanks	A
128. Check cooling system hoses, pipes, pumps, gauges, blow rad.	2
129. Check calib. hot eng. alarms, water temp. and pressure gauges	4
MISCELLANEOUS OPERATIONS	
135. Fill all locomotive fuel tanks	A
136. Fill all engine sand boxes	A
137. Clean cabs, floors and windows	A
138. Clean all loco. glass, exterior and interior	A
139. Clean engine room walls, floors, assemblies	A
142. Lubricate fixed couplers, rear A, front B	A
143. Lubricate coupler parts and pin lifter linkage	A

From the foregoing, we have shown how the Master Schedule of Maintenance and Inspection Operations, the Locomotive Trip Sheet, and the Terminal Maintenance Record are used to set up, work from, and provide a complete signed record of all service operations and related information, pertaining to that particular Diesel freight locomotive on that particular trip.

Following completion of all work and handling of the above named forms, the Locomotive Trip Report and the Terminal Maintenance Record are clipped together and sent to the office of the Diesel supervisor. The Diesel Supervisor examines these records to determine whether or not Maintenance and Inspection Operations are being properly handled, then the reports are filed in the office of the Diesel Supervisor, by locomotives and trips consecutively. Such reports are retained for a period of three years.

TRAVELING DIESEL ELECTRIC MAINTAINERS

A Traveling Diesel Electric Maintainer is always present on a Diesel Freight Locomotive from the time it is dispatched from Burnham until it returns from the round trip to Salt Lake City. Their function is to perform such main-

tenance and inspection operations as can be performed enroute as well as such work as might become necessary due to accident or locomotive failure. The TDEM's work in two groups, one group handling locomotives between Denver and Grand Junction, the other handling locomotive between Grand Junction and Salt Lake City. These men are called at Burnham, Grand Junction and Salt Lake City, at the same time that engine crews are called to take the locomotives out of these terminals. The TDEM's remain with the Diesel locomotives at all times enroute and at Grand Junction and Salt Lake City until they are relieved by the relieving TDEM. Upon arrival at Burnham they are relieved by terminal maintenance forces. Thus, a mechanical department employee is in constant attendance on Diesel freight locomotives at all times.

DEPARTURE OF LOCOMOTIVE FROM MAINTENANCE TERMINAL AND TRIP HANDLING

Each Diesel Freight Locomotive dispatched from Burnham is supplied with certain forms pertaining to that particular trip. These forms and their handling by the TDEM's are as follows:

1. Diesel freight locomotive Trip Report—Form 3417 rev.

This report is printed on white paper size 8 1/2 in. x 13 in. Form is prepared by Diesel maintenance foreman or lead man prior to locomotive departure, information being copied from the Master Schedule of Maintenance Schedule of Maintenance and Inspection Operations. There are usually about 45 of the total 122 operations listed on this form that are due on any one particular trip. The complete procedure on this form will be found elsewhere in this Manual.

Normally, four TDEM's will work on the Diesel locomotive, two westward and two eastward, during the round-trip. These men carefully check the Locomotive trip report for operations listed as being due that trip. Each man performs such operations as time and operating conditions will permit, placing his initials to the right of all operations and work completed. Prior to the return of the locomotive to Burnham, in most instances, the TDEM's will have completed all work that can normally be done enroute. On the reverse side of the locomotive Trip Report, each TDEM in the spaces provided, notes the portion of the trip during which he was on duty, lists any materials needed on the engine, keeps a running record of the locomotive performance during the time he was on duty, and lists the additional work per-

formed over that listed as routine Maintenance and Inspection Operations.

Upon arrival of the Diesel locomotive at Burnham, the Diesel maintenance foreman or lead man will board the locomotive and list the un-worked items remaining on the Trip Report on the Terminal Maintenance Record for handling by Terminal Maintenance Forces, as outlined earlier in this Manual under Burnham Handling of Diesel Electric Freight Locomotives.

2. Diesel Fuel Oil Consumption—Form 2880. This form is printed on white paper 8 1/2 in. x 11 in. The TDEM shows on this report the total amount of fuel in locomotive tanks upon departure from terminal and indicates the total amount of fuel in locomotive tanks at each Division Point and including the terminal where he turns the locomotive over to the relieving TDEM. This TDEM shows the total amount of fuel in the locomotive fuel tanks upon departure from his terminal and at each Division Point until he leaves the locomotive. This information is recorded by each TDEM until the locomotive returns to Burnham where the final fuel total is recorded by the TDEM on the locomotive upon arrival at Burnham. Any fuel additions made enroute at any terminal are noted by the TDEM on the locomotive at the time and added in with the total at time of addition and carried on by the following TDEM's. After the round-trip has been completed at Burnham, the Fuel Report is mailed directly to the Fuel Department by the TDEM making last entry. The functions and handling of the Fuel Report, Form 2880, are explained elsewhere in this Manual.

3. Delays Enroute Report—Form _____

This report is printed on white sheet 8 1/2 in. x 11 in. The Form is divided into four spaces showing locomotive Number, Date, From (show point of departure) and To (show point of leaving locomotive). In the first of the four spaces, the first TDEM will show major delays enroute, giving location of delay, reason for delay and total elapsed time of delay. Each following TDEM uses the proper space allotted for his report on the Form. Upon completion of the round-trip, the completed Form is mailed to the office of the Diesel Supervisor who in turn transmits the information thereon to the Office of the Assistant to the Chief Mechanical Officer.

Reports of mechanical failures enroute, or other deviations from the above outlined procedures are handled by the TDEM's in accordance with . . . And now please turn to page 82 . . .

T HE is divide Labora the other imrover Currently more tha oratory sists, eng it can be of wide s improve industry. The major Labora 1. To ar purcha check are up ance se 2. To im in the our o with t supplie 3. To fin used b fills an problem rials. 4. To exp rials of to an e new pr 5. To inv While it is tion for o search pro of this art Diesel oper the qualit With rega control, w as filter p various sy materials g To illus cized let u Fuller's ea fuller's ear . Chief E

THE Research Laboratory herein described is divided into two sections; one is a Control Laboratory for checking current production, the other is a Research Laboratory which is engaged in the development of new products and improvement to existing products.

Currently the Research Department occupies more than 10,000 square feet of office and laboratory space and employs 15 full time chemists, engineers and laboratory assistants. Thus it can be seen that the research facilities are of wide scope and intensive effort is exerted to improve the filters and refills used in the Diesel industry.

The major functions performed by the Research Laboratory are:

1. To analyze and control all raw materials purchased and to physically and chemically check finished products to insure that they are up to minimum standards of performance set by the Engineering Department.
2. To improve materials currently being used in the various products by research work in our own laboratories and in cooperation with the Research Departments of various suppliers.
3. To find new uses for the existing materials used by means of designing new types of refills and filters to better solve the existing problems in oil filtration or to meet new problems in oil filtration with existing materials.
4. To experiment with and develop new materials of filtration, either as an improvement to an existing filter design or as a completely new product development.
5. To invent and develop new products.

While it is impossible to discuss the latter function for obvious reasons and while certain research projects are restricted it is the purpose of this article to discuss the main functions of the Research Laboratory in order to inform the Diesel operator of the methods used to maintain the quality of, and to develop new products.

With regard to the first function, that of quality control, we analyze such diverse raw materials as filter paper, fuller's earth, silicate of soda, various synthetic resins and a host of other materials in order to determine that the raw materials going into the product are up to par.

To illustrate the close chemical control exercised let us take fuller's earth as an example. Fuller's earth which goes into the patented fuller's earth block refill is purchased-in carload

* Chief Engineer, Briggs Clarifier Company.

Fig. 1. Fullers earth roaster and storage silo.





Fig. 2. Fullers earth block tester.



Fig. 3. General view of the analytical laboratory.

lots. Each carload is sampled before it is unloaded. The laboratory control chemists check the samples for screen size, hardness, volatile matter, moisture content and activity. Before any treatment on the fuller's earth is performed it must be certified as conforming to specifications.

After the fuller's earth has passed initial inspection it is heated in a special oven designed and built under the supervision of the Research Laboratory. Figure 1 shows an external view of this oven and the storage silo. The final product is again checked for volatile matter and activity before it is stored for use in production. From finished storage the fuller's earth passes through a series of operations each of which is under strict laboratory control. These operations consist of humidification, mixing with various chemicals, moulding into a cylindrical block and curing in a specially designed oven.

Laboratory control and testing continue after the cylindrical blocks have been pressed and cut to proper size. Test specimens are taken from each day's production and are checked for mechanical strength both in the dry state and when saturated with oil, and are checked for activity of the adsorbent material. Figure 2 illustrates this apparatus with a block in the place for testing. Poor quality in any of these tests will result in the whole batch of blocks being rejected. This is done to assure only highest quality blocks being used in finished refills.

The same scrupulous care and laboratory control in other raw materials is part of standard practice. This results in uniform quality of performance of the finished filter and refill.

Another function of the Quality Control Section of the laboratory is analysis of oil samples sent

in by customers. The analysis is made to determine the characteristics of the oil in their engine so that they will have an accurate guide as to when refills should be changed. Figure 3 shows a view of the analytical section of the laboratory illustrating both the control equipment and the oil analysis equipment.

The second and third functions of the laboratory i.e., improving existing materials and developing new materials may well be described together. This work is started in the laboratory on bench test machines and progresses on into field tests of full scale equipment on actual Diesel engines and industrial machinery under many varied operating conditions.

The bench test program is divided into two sections: one for the improvement of the adsorbent clay, or fuller's earth, which removes acids, gums, resins and asphaltenes, and the

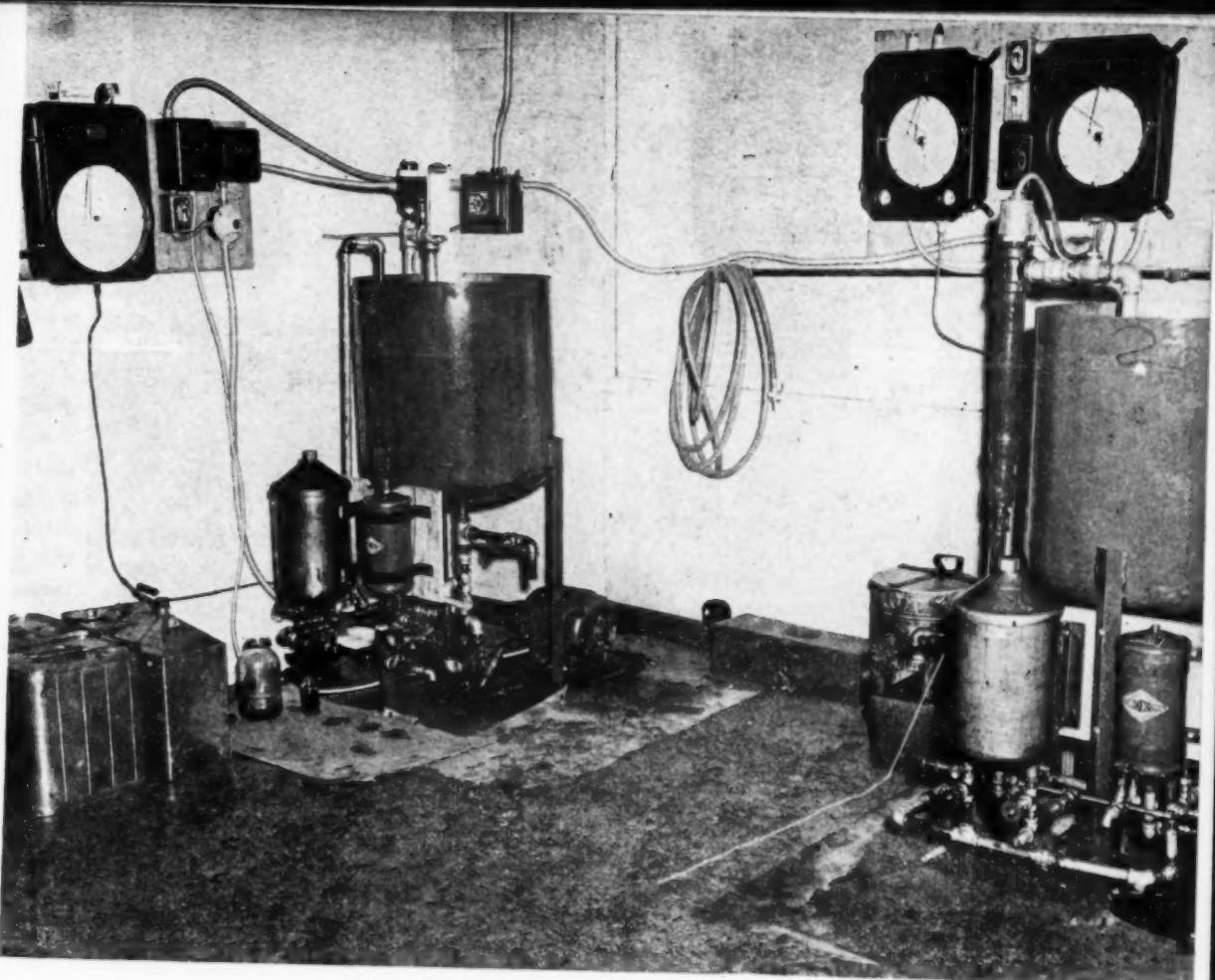
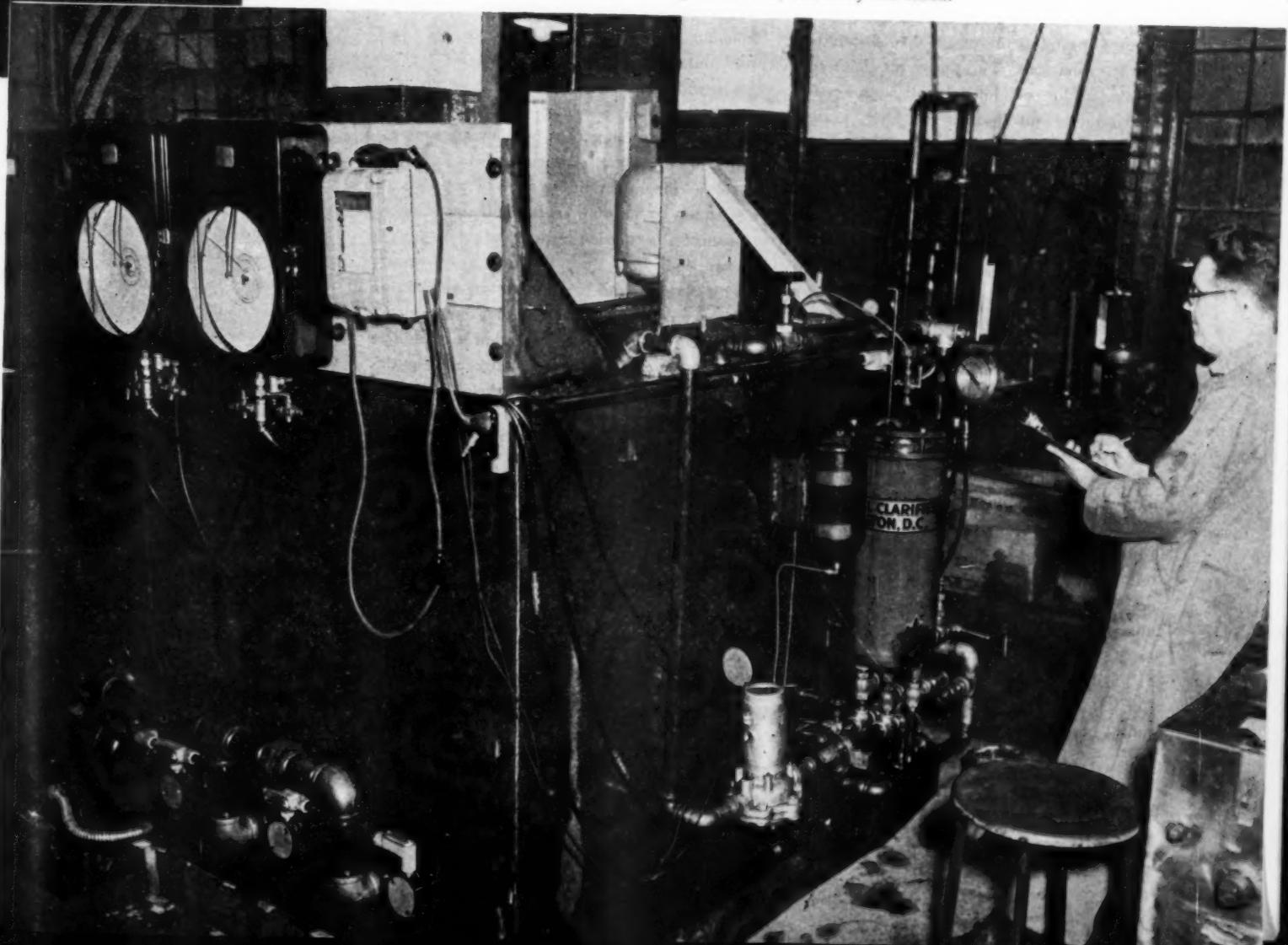


Fig. 4. Apparatus used for testing absorbent materials.

Fig. 5. View of the Navy test stand.





second for the improvement of the absorbent cellulose which removes solid material.

Figure 4 illustrates the bench used for testing adsorbent materials. This apparatus consists of a tank for the contaminated oil, a pump for circulating the oil through the filter, heaters for heating the oil, a complete set of automatic controls for maintaining any desired temperature and pressure, a meter for measuring flow rate and recording instruments for temperature, pressure and flow. The oil used in this machine is contaminated with acids, gums, resins and other materials soluble in the oil which are known to be present in used Diesel engine oil. The machine may be operated as a batch clean-up system, wherein the tank is filled with heavily pre-contaminated oil, or as a continuous system wherein the test is started on clean oil and contaminants are added at frequent intervals in small quantities. The former method is used for determining the activity of blocks in production, for direct comparison of new adsorbent materials and for developing new uses for the adsorbent block. The latter method, which is designed to simulate actual operating conditions, is used to establish an index to life expectancy of the refill.

For the second part of the program, the removal of solid materials, there is a test stand

similar to that used in the adsorbent research but which is equipped with a positive four speed lubricator, set to pump in a definite amount of dirt at a continuous rate. The rate of contamination can be varied for various tests within quite wide limits; however, it is normally set to introduce the contaminant at the maximum rate of dirt build-up encountered in a 100 hp. Diesel engine. The size filter and rate of contamination are selected to duplicate as closely as possible actual field operation in as short a test period as practical.

This type of stand is also used for determining flow rates on various refills and for miscellaneous tests such as the determination of additive removal, etc. The type of sludge used in this work is a synthetic sludge developed by the laboratory staff and consists of a very fine grade of carbon black ground into lubricating oil of the same type and viscosity as that used in the test. This material corresponds with field results and has the virtue of being a consistent material which can be used year after year without change. Thus, filter tests on one type of refill run a year ago are still valid and can be compared with current tests.

With the entry of the U. S. into the war there was an unprecedented demand for oil filters by the armed services. The large volume require-

ments necessitated establishment of some form of test for oil filters and refill elements. As a result two standards were set, one for the Army which is primarily concerned with automotive equipment and one for the Navy which is primarily concerned with Diesel equipment. The products under discussion are essentially Diesel engine filters, therefore a test stand was built duplicating as closely as possible the Navy Standard test procedure. The principle purpose of this stand is to develop improvements in the Navy Standard Refill. However, the nature of this test procedure lends itself to a variety of special development work. The stand itself consists of a large capacity tank which is filled with highly pre-contaminated oil, circulating pump, automatic heat and pressure controls, flow meter and recording instruments. The test consists of circulating the oil through the experimental refill until the entire batch of oil is clean or until flow through the refill stops indicating that it is completely loaded. A picture of this stand is shown in Figure 5.

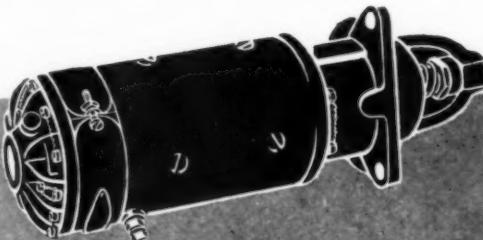
The work of developing and improving standard products and of maintaining quality control of finished goods is the most important performed by the research staff. However, the Research Department in conjunction with the Engineering Department also maintains an experimental laboratory suitable for producing specialized filters for applications on which the standard product does not appear to be suitable.

While it is next to impossible to describe the general work done by this department, a typical example is illustrated in Figure 6. In this particular case the customer had a specialized problem in the storage and dispensing of large quantities of Diesel fuel. The volume of fuel to be handled was greater than the maximum capacity of standard fuel filters. An entire testing procedure on fuel oil was developed, special refills were designed and tested, and finally a full scale model of the filter was built and tested. This stand is currently being used for quality control testing of these filters. As a result of this work a complete line of bulk fuel handling equipment has been added to the standard line of fuel oil filters.

Any Diesel operator who has experienced the many problems which can result from dirty lubricating oil appreciates the importance of a dependable filter of adequate capacity. Through the medium of the Research Department, we endeavor to keep abreast of the latest developments in the Diesel industry in order to have available the product to meet any oil filtration problem which may arise.

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AUTO-LITE engineers were among the first to start internal combustion engines electrically. Today, Auto-Lite has had thirty-three years of experience in building automotive electrical equipment.

As a result, Auto-Lite has available manufacturing facilities and engineering "know-how" that are proving of tremendous value to Diesel engine builders in solving problems involving electrical starting and generating. Auto-Lite systems for Diesels are complete from generator to voltage control to battery to starter.

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THIS TIME LET'S KEEP OUR MERCHANT MARINE

By C. H. WEAVER*

Editor's Note: So much has been said about the U. S. Merchant Marine after the war and we are so thoroughly in accord with the idea of making this arm of our nation strong and far-reaching that we are glad to reproduce herewith Mr. Weaver's announcement, recently made to a group of maritime editors, of his company's plans toward creating a nation wide marine consciousness.

“As a part of the Marine Industry, Westinghouse has been doing a lot of thinking about how to help carry to Mr. and Mrs. America the story of our Country's need for Maritime strength after the war. Naturally, as a leading supplier to the Marine Industry we are directly interested in its future—but beyond this, we have a patriotic interest which we desire to spread to every man, woman and child in America.

"After careful analysis, we've decided to tackle the job of trying to show every United States citizen, regardless of where he lives the importance of keeping a strong Merchant Marine. We must face the fact that what Westinghouse and the Marine Industry thinks about the need for a strong Merchant Marine is of little consequence unless the general public agrees.

"This is a long haul job, and more difficult than would face some of our other industries. For example, the American public probably realizes the effect of Central Station, Transportation and Industrial activities on their lives, because of the proximity of these industries, much more than the effect of our Merchant Marine. So the chore is really one of broad basic education. We must protect against public thinking which is aimed at tossing our Merchant Marine on the scrap heap—by making every man, woman and child, regardless of his home address, conscious of the importance to his welfare of a strong Merchant Marine.

"In 1800 we were a strong Maritime nation, carrying 90 per cent of our commerce in American bottoms, but by 1914 we had declined to a point where our own ships transported only 10 per cent of our trade. The first World War shook us out of our complacency, but we soon drifted backward—carrying only about 30 per cent of our commerce in our own vessels. Only two Merchant ships over 2000 gross tons were built in this country in 1934!

* Manager, Marine Department, Westinghouse Electric and Manufacturing Company.

"The Merchant Marine Act of 1936, although passed in Congress by a very slim margin, represented the foresightedness of capable men who knew the importance of a strong Merchant Marine. It has given us a strong foundation on which to fight this war and maintain ourselves as a dominant Maritime power in world commerce after the war. The Merchant Marine Act of 1936 says specifically:

"It is necessary for the national defense and the development of the foreign and domestic commerce that the United States shall have a Merchant Marine sufficient to carry its own domestic water-borne commerce and a substantial portion of the water-borne export and import foreign commerce of the United States."

"A 'substantial portion' is not 10 per cent or even 30 per cent. And beyond increasing our share of what has been our foreign commerce in the past, we have before us the very logical goal of increasing that commerce. Admiral Land recently stated, 'We have not scratched the surface of our foreign trade potential.' American industry has a great productive capacity for making things the world will need. World War II has made us a great shipbuilding nation—but a great shipbuilding nation does not assure a Merchant Marine of power.

"To help the American public understand the benefits of a strong post-war Merchant Marine, Westinghouse is going to use practically every advertising and public relations technique. These include color advertisements, a free educational map, radio talks and announcements. "The first advertisement was headlined 'This time—let's keep our Merchant Marine.' This keynotes our basic idea. It gives the public an appreciation of the importance of the Merchant Marine—in conducting a successful war or maintaining a successful peace. The copy says, in effect: The weakness of our Merchant Marine was an open invitation to war. The Axis knew we were weak and nearly caught us flat-footed when they struck. Fortunately, the Merchant Marine Act, drafted in 1936, gave us the start we needed to build our present powerful fleet. Interesting enough, I think, to get the reader's attention. Cynical enough, I hope, to make him fightin' mad.

"Apart from the importance of the Merchant Marine to our nation as a whole, we are going

to try and make clear to the American public that the Marine Industry is not exclusively a coastwise industry. The second ad will be entitled 'Sioux City is a Seaport now' and is the beginning of that story which will be featured in many of the ads to follow.

"The copy explains that no longer is Sioux City remote from the sea—that Iowa's butter, eggs, corn, fruit, farm machinery and seeds must be carried abroad in ships, and that the nitrates need to produce still more food; must be laid down on American docks by ships. We have learned that America cannot live within itself; that our life lines extend around the world and that adequate shipping facilities to maintain its life lines is a measure of our wartime strength and peacetime security; that never again must we give an enemy the chance to make war on the gamble that we will not be able to hurl our vast productive power against him until it is too late.

"We will show that there is scarcely a community in the country that is not directly engaged in producing materials for our merchant fleet. Denver's shops build hulls, bulkheads and deck sections. Pittsburgh has important ship yards on the Ohio River, at Neville Island and Ambridge. And steel—Pittsburgh is the most steel-conscious city in the world, and for that very reason should be the most Marine-conscious. Denver and Pittsburgh are typical of many inland cities. They don't know whose hand is feeding them. Miners in Montana, Wyoming, Colorado, Utah and New Mexico dig tons of copper, molybdenum, vanadium, lead and zinc for the Merchant Marine fleet. Missouri, Kansas, Nebraska and Arkansas sell several hundred million dollars worth of lumber, cement, wire, Diesel engines, electrical equipment, and many other items to the Merchant Marine. Arkansas sells them cutlery. Illinois, Wisconsin, Indiana and Iowa are developing an enormous trade with the shipbuilding industry, partly because this area is third in the production of iron and steel. Submarines and oil tankers are being built in Wisconsin. Minnesota, North Dakota, South Dakota are manufacturing landing barge equipment, hand tools, lumber, machinery and electrical equipment for our expanding fleet. The Mesabi and Vermilion Ranges in that area feed iron ore to our blast furnaces.

and now please turn to page 87

Capsules

OF LIFE OR DEATH!

Valves—that's what these are—and their innocent appearance serves only to conceal their importance. For these valves are to modern warfare what the famous "horseshoe nail" (for the want of which the battle was lost!) stood for in the simpler fighting days of two hundred years ago. Designed for the control of oil, gas and other fluids, they are in active wartime service in aircraft of all types on every fighting front.

The four Weatherhead plants have long been fully engaged in making vital parts for the nation's

war machines at the rate of more than a million a day—and are prepared to make the same gigantic contribution to the peacetime needs of the nation!

Look Ahead with



Weatherhead

THE WEATHERHEAD COMPANY, CLEVELAND, OHIO
Manufacturers of vital parts for the automotive, aviation, refrigeration and other key industries.

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SUPERVISING & OPERATING ENGINEERS' SECTION

UNDER PRESENT CONDITIONS, ARE UNIT OUTAGES FOR YEARLY INSPECTIONS JUSTIFIED

Conducted by R. L. GREGORY *

DURING the past four years we have heard a lot of arguments on the above question, arguments both pro and con, as to whether outages for yearly major inspections and overhauling of units were necessary. Prior to the war and our all-out production schedules, it was standard practice in the great majority of power plants, to prepare for, and conduct yearly inspections on all generating units and prime movers. It was also standard practice with the manufacturers of this equipment to recommend such procedure, since they felt that it was not only a valuable asset to the plant, but it also gave the manufacturer information, which he deemed essential in the design and upkeep of his products.

But with the adoption of our all-out production schedule, some individuals as well as organizations (and many of them without practical experience in plant operation) advanced the idea that manpower, time and materials used in such inspections and overhauling could be diverted to more useful fields, by foregoing these outage periods. They further promoted the idea that units could be kept operating by doing this work on a "catch-as-catch-can" basis. Theoretically this would be an ideal condition and a great boon to our all-out production effort, but from a sound engineering and operating standpoint, such a procedure would in the long run be very impractical.

Every mechanical and electrical unit has its inherent weakness, and if allowed to operate day in and day out, without proper care and maintenance, eventually that weakness will appear and sooner or later cause trouble. And Diesel units are not immune to these weaknesses, any more than a steam turbine, a hydro unit or any other class of prime movers. The fact of the business is, that in the design of most internal combustion units, there are so many more mov-

ing parts, which are vital to engine operation, that they require more frequent and careful inspection and maintenance.

Some engineer will undoubtedly question this statement and point to the fact that he has a unit or units that have operated for years without any major inspections or overhauling and that his units are operating just as well today as they did five years ago. To such an engineer I will merely state that I rather question the fact that they are operating just as well as they did five years ago, providing they have been in average operation during the last five years. How does your fuel rate, lubricating oil consumption and overall efficiency of today compare with that of five years ago?

The plant that really needs the yearly inspection and outage for major overhauling is the plant whose generating capacity is of a limited nature, and whose load demand requires the operation of practically all equipment all of the time. He may have to shut down for a few days, delaying production and output, may even have to work long hours to hasten the overhaul and lessen the outage period, but in the long run it is a paying proposition. When production is again resumed his units are in

operative system for yearly inspection and major repairs. The industries realize that they must devote a few days out of the year to inspection and repair. They also realize that the plant furnishing them with power, whether a part of their own plant or a municipally owned one must too have an outage period for major repairs, that is, if it is limited in generating capacity. So they get together and set definite periods when the industries do not need power and thus units will be free for outage. In this manner they are all able to accomplish definite results, with a minimum of lost time.

* The larger plants with plenty of reserve capacity should also have yearly inspections and outage for major repair and maintenance work. Of course having ample reserve, time is a minor factor. However, the fact remains that no prime mover in any power plant can be expected to give efficient and economical service unless it is periodically inspected and repaired. The design and construction of all types of prime movers are such that a good thorough job of maintenance and repair cannot be accomplished by the "lick and a promise method." Sufficient outage must be available to accomplish the proper results.

Yearly inspections are justified, since they are insurance not only against forced outages, but are also insurance as to the longevity of the equipment. During the last world war many plants forewent the practice of yearly inspection and the writer recalls one in particular where no thought was given to any major repairs on their five units for over four years. It was rather lucky for this particular plant that the war ended when it did, for had it lasted another year, they would not have been able to carry on with their load demand, due to the rundown condition of their generating equipment. When they finally did decide to shut down and do a major job of overhauling they found it to be a very expensive job, since many of the unit parts had to be fully replaced.



good mechanical condition, and using a slang phrase, "Are in condition to take it on the chin." Those in charge of production can then feel free to "Step on it" without fear of unit failure in their power source.

Many communities where the local power plant serves several industries have worked out a co-

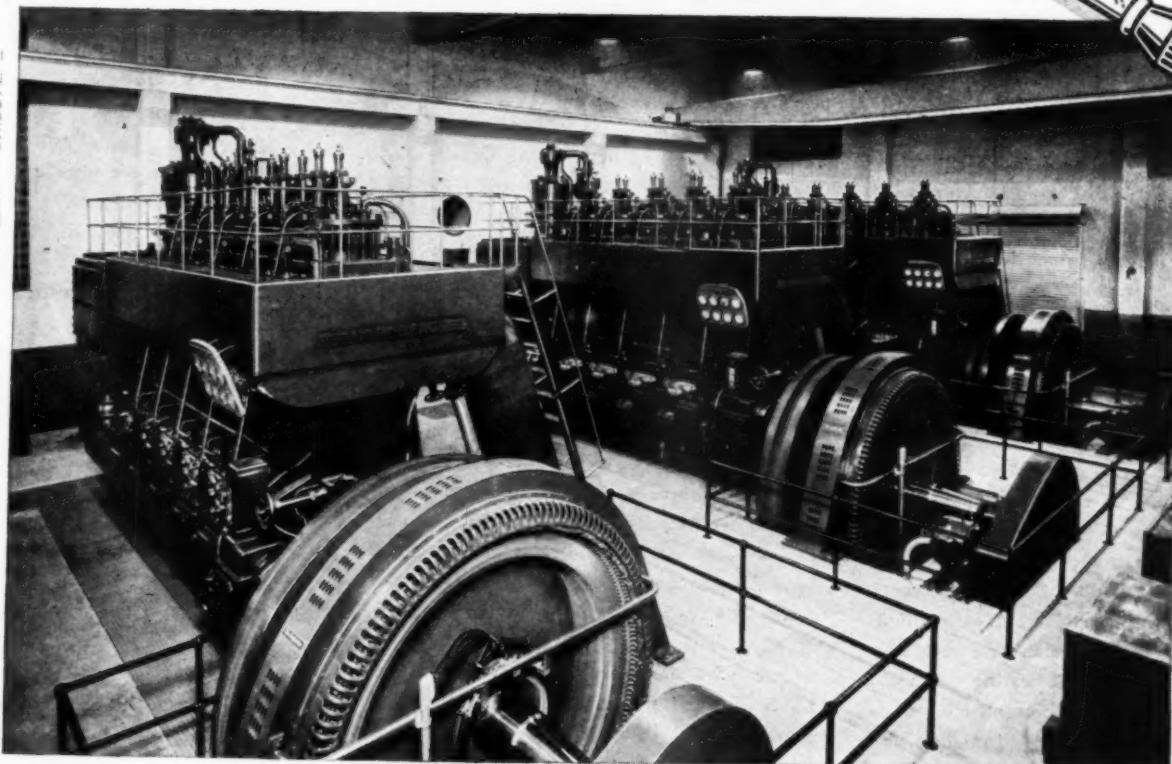
* Chief Engineer, Municipal Water and Light Plant, Hillsdale, Michigan.

ON

IONS

Correct Lubrication

MEANS
BETTER MAINTENANCE



- Very often, *correct* lubrication is the remedy for difficult maintenance due to excessive wear.

For *correct* lubrication of **DIESEL ENGINES**, Sinclair provides Rubilene and Gascon Oils designed for wear-prevention under continuous heavy duty oper-

ation. Rubilenes and Gascons are non-sludging, non-corrosive lubricants that promote internal cleanliness and longer operating periods between overhauls.

• • •
(Write for "The Service Factor"—published periodically and devoted to the solution of lubricating problems.)

SINCLAIR INDUSTRIAL OILS

FOR FULL INFORMATION OR LUBRICATION COUNSEL WRITE SINCLAIR REFINING COMPANY, 630 FIFTH AVENUE, NEW YORK 20, N. Y.

Exchange Your Diesel Maintenance Ideas

"Diesel Engine Bearings"

Conducted by R. L. GREGORY

Editor's Note: In this department we provide a meeting place where Diesel and Gas engine operators may exchange mutually helpful maintenance experiences to keep our engines in top condition. Mr. Gregory edits your material and adds constructive suggestions from his own wide experience. This is your department—mail your contributions direct to DIESEL PROGRESS.

THE following letter has been received from Mr. L. D. Laurent of New Roads, Louisiana:

"I would appreciate any information which you can give me on Diesel engine bearings. I would like to purchase a manual or hand book, explaining how to properly fit relined bearings, remove scored spots on crank journals, determine the cause of bearing failures and whether the use of lapping compound is a good practice. Would also like to know where scrapers for Diesel bearings may be obtained?"

There are several good manuals and hand books on Diesels and Diesel maintenance which you can secure. A good source of such information is pamphlets put out by many of the large oil companies on the subject of bearings and their care. It is to their advantage to help engineers in this matter, because no oil vendor can expect his oil to do a bangup job where bearings are worn, journals scored, or misalignment is present. Therefore they have made considerable study of various bearing materials, clearances, and other conditions affecting bearing wear, in order that they may produce lubricants to give these units proper service, when bearings are properly maintained. Most of the larger oil companies have prepared pamphlets covering this subject most thoroughly and are glad to furnish them to you upon request.

One thing should be kept in mind when maintaining bearings. There are so many makes of units, using varying types of bearing materials, operating at different speeds and under different conditions, that affect bearing wear, that when one commences to have bearing troubles, he should consult the manufacturer of his particular unit on the subject.

When relining bearings, many engineers do not understand the proper method of bonding, the characteristics of bearing metals, nor the allowable tolerances. They go ahead without con-

sulting the designers and the result is that they may get into a flock of trouble before they finally get straightened out of their difficulties.

Bearings must be so designed of the proper material, that they have a marginal safety factor to take care of undue strains and stresses which may be thrown upon them. The manufacturer or designer knows what his engine will do, and consequently knows what materials should be used, and how these materials must be handled and bonded together and to the shell.

When one speaks of determining the cause of bearing failure, he has a large field to cover, since there are many causes which may result in such failures. This subject was discussed in the December 1943 issue of DIESEL PROGRESS, and while not all the points could be covered, most of them were partially covered in that article.

I fear that we are often prone to either condemn the manufacturer, designer or the lubricant for our bearing failures, but a survey of the subject proves in nine cases out of ten, that the difficulty may lie right in some local condition of our units. In making such a statement, I do not wish to insinuate that designers or oil vendors do not make mistakes. None of us are infallible. It is possible to get a bad batch of metal in bearings, a poor batch of lubricant once in a while, or a poor mechanical job of repair.

But when bearings fail there is usually a definite cause, and as previously stated will in most cases be a local condition. Therefore before condemning any particular designer, oil product, or bearing material it is well to eliminate all local possibilities first, such as moisture, acids, electrolysis, misalignment, unbalanced thrust, and the many other local conditions which might cause the trouble. And remember they are legion. Most bearing failures can be traced to one of these local conditions.

The use of a lapping compound in some cases is permissible. However, judgment and care should be used and a very fine grade of compound should be used. I know of no better way of removing scored spots on either journals

or bearings, than the use of a good oil stone or hone. This, of course, applies to cases where the journal or bearing is but slightly spotted. In cases where the bearings are badly scored or the journal badly cut, the hone is of but little value except in finishing up the job.

Badly cut bearings should be relined, and never used when wear is excessive. If slightly cut in many cases they can be saved by use of a heavy oil with some soft abrasive mixed with it such as sapolio or powdered Bon Ami. This is often used. Then also there are many soft abrasives made which can be used.

As to bearing scrapers, many types and shapes are available at large machine tool dealers. If one has a good mechanic he can make his own and for straight scraping on a flat service I know of no better scraper than the blade from a planing machine, such as is used in the planing of lumber. These blades can be ground perfectly straight and are made of the finest of steel. When properly ground and sharpened they make a most useful scraper. If specially shaped scrapers are needed, they can be forged out of good steel and then ground to proper shape and sharpened.

TYPICAL BEARING COMPOSITIONS, %

Copper-Lead	70 Cu	30 Pb
Aluminum	96 Al	4 Cu
Bronze	86 Cu	7 Pb
Silver	99 Ag	
Cadmium-Silver	98 Cd	2 Ag
Hardened Lead	97 Pb	2 Sn
Lead-Silver Babbitt	78 Pb	15 Sb
Tin Base Babbitt	89 Sn	7 Sb
Lead Base Babbitt	85 Pb	10 Sb
Lead-Tin Coatings	96 Pb	4 Sn
Lead-Indium Coatings	96 Pb	4 In

PROPERTIES OF METALS

	Symbol	Brinell Hardness	Melting Point °F.	Conductivity
Hardened Steel				
Shaft	Fe	600	2600	9
Steel Shaft	Fe	250	2600	9
Copper	Cu	75	1980	9
Antimony	Sb	75	1170	1
Silver	Ag	38	1760	10
Aluminum	Al	22	1220	3
Cadmium	Cd	22	610	2
Tin	Sn	5	450	2
Lead	Pb	5	450	2
Lead	Pb	4	620	1
Indium	In	3	320	1

Sutter Basin:*Continued from page 39*

away, to the low spot in front of the drier-elevator. The tractors and jeeps are all Caterpillar Diesels with LaPlant Choate carriers and bulldozer. Mr. Parker is the successor to one of the most famous of all road contractors in northern California—Hemstreet & Bell—which passed out with the death of one of these key figures a few years ago. Mr. Parker has largely replaced the old butane-burning equipment.

Over North America's Roof:*Continued from page 68*

instructions issued by the Office of the Diesel Supervisor and the Office of the Chief Mechanical Officer, such instructions being issued as required, by letters and through use of DS (Diesel Supervisor) Bulletins and CMO (Chief Mechanical Officer) Bulletins.

Assisting with part of the Diesel operation at

Grand Junction, Colo., half way point on the run, is Mr. Paul F. Giesking, Master Mechanic. Assisting Mr. Whipple at Denver is R. F. Milligan, Assistant Diesel Supervisor. Ray McElroy is Engineer of Tests in charge of the D & RGW Research laboratory where lube and fuel oil tests and lube oil sampling tests are made. And Messrs. George F. Dodge, Director of Public Relations and his able Assistant, Harry F. Walker, both in Denver Headquarters, come in for honorable mention with their supply of charts and photographs and data that makes this series possible.

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When "Standard" means "Tailor-Made"

ROSS
HEAT EXCHANGERS
COOLERS
HEATERS
CONDENSERS

FULL DETAILS ON

Larger Coolers in Bulletin 5322
Smaller Coolers in Bulletin 4922
Oil Heaters in Bulletin 3624A

WRITE TODAY!

ROSS HEATER & MFG. CO., INC.

Division of AMERICAN RADIATOR & Standard Sanitary CORPORATION

1425 WEST AVENUE

BUFFALO 13, N. Y.



**American Locomotive Company
Elects Perry T. Egbert,
Vice President**

THE Executive Committee of the Board of Directors of the American Locomotive Company recently announced the appointment of Perry T. Egbert, Vice President in charge of Diesel Locomotive Sales.



Perry T. Egbert, elected Vice President
American Locomotive Company.

Mr. Egbert has served the company in sales capacities since 1921, when he was appointed technical representative in the Far East, returning to the U. S. in 1924. He graduated from Cornell in 1915 with a Mechanical Engineering degree, was employed by the Lehigh Valley and Norfolk & Western railroads and from 1916 to 1919 served as a pursuit pilot in the U. S. Air Corps. In 1920 he joined the Engineering Department of the American Locomotive Company.

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Honan-Crane Corporation Becomes a Subsidiary of Houdaille-Hershey Corporation

ON June 8 the Houdaille-Hershey Corporation bought all of the stock of the Honan-Crane Corporation. Honan-Crane will be operated as a subsidiary of the Houdaille-Hershey Corporation and there has been no interruptions in either manufacturing or sales activities. The corporation will continue to manufacture the same equipment and the change in corporate status will not affect any of the present policies.

The sale of the Honan-Crane Corporation was a carefully studied move on the part of both corporations, a move designed to insure the future success of Honan-Crane in the coming postwar industrial world. In becoming a subsidiary of the Houdaille-Hershey Corporation, Honan-Crane has gained the financial backing and executive cooperation of one of the important corporations of this country.

Honan-Crane will now have at its disposal the facilities to enable it to accomplish in the next few years what it might take Honan-Crane many years to accomplish by itself. Research laboratories will be expanded, manufacturing properties increased and sales engineering intensified in both scope and territory covered. In all of these activities Honan-Crane will have the assistance and cooperation of the entire organization of Houdaille-Hershey Corporation.



Left to right: Claude R. Crooks, A. S. Harlan
and Paul R. Honan

The present management: Paul R. Honan, Claude R. Crooks, *V. S. Crane and A. S. Harlan will continue to direct the activities of Honan-Crane. All of these men are widely known and have made important contributions to the field of Oil Purification Engineering. *V. S. Crane, due to health, will confine his work to a consulting capacity. Honan-Crane offices, plant and research laboratories will remain in the present location of the corporation.

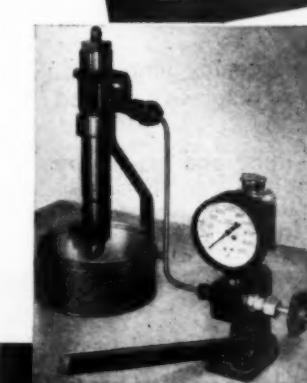
A copy of an interesting eight page announcement covering the full details of this change will be mailed on request. Write Honan-Crane Corporation, 600 Indianapolis Avenue, Lebanon, Indiana.

ADECO

SAFEGUARD DIESEL ENGINE PERFORMANCE with Dependable ADECO FUEL INJECTION EQUIPMENT



Adeco equipment is engineered to secure the optimum performance of the engine you are building or plan to build. Today's line of fuel injection pumps, nozzles and nozzle holders is the most dependable in Adeco history—the result of years of pioneering and research for the diesel industry. Their performance speaks louder than words in pointing the way to the finest in diesel fuel injection equipment.



**ADECO NOZZLE TESTER
for LOW-COST MAINTENANCE**

America's most widely used Nozzle Tester enables any mechanic to make quick, accurate tests on injector opening pressure, spray pattern, etc., and detect stuck needle valves and leakage around valve seats. Compact, portable, sturdy, precision-built. Pressures up to 10,000 p.s.i. Tests both large and small injectors. Avoids costly delays and possible damage to engine. Also obtainable with Navy-approved gauge. Write for bulletin.

Ideal for Testing Hydraulic Equipment

AIRCRAFT & DIESEL EQUIPMENT CORPORATION
4401 RAVENSWOOD AVENUE, CHICAGO 40, ILLINOIS

Self-Propelled Diesel-Electric Train Promises Improved Service to Post-War Commuters

A "THREE-IN-ONE" passenger train, driven by a packaged electric power unit that can be quickly detached and replaced, has been designed by a Westinghouse engineer to provide swifter, roomier and quieter service for post-war commuters.

Planned for maximum passenger space and easy maneuverability, the train will be made up of three articulated, or interlocking sections:

a passenger car at each end and a compact, walled-off compartment in the center containing a Diesel engine, electric generator and control equipment.

No overhead wires are necessary since the power package contains all that is necessary to furnish power for the electric motors which drive the train. Operator's cabs at either end enable the train to be driven in and out of station terminals without involved switching delays.

"A train of this type will do much toward speed-

ing up traffic in congested terminals," declared A. H. Candee, transportation engineer with the Westinghouse Electric and Manufacturing Company and designer of the train. "When a locomotive-hauled train enters a terminal station having dead-end tracks, it must be backed out and turned around, then backed into the station before it may be used for outbound passengers. This usually involves eight separate switching movements before the inbound train is ready for its outbound trip. But with a train containing its own driving power and with control compartments at either end, the number of movements is reduced to two in entering and leaving the station."

The power unit of such a train, the engineer said, can be removed for repairs almost as easily as you can change a tire on your automobile. When the equipment shows signs of needing overhauling, the train is driven to the shop where the "power package" is lifted out and another substituted. This will enable railroads to keep a maximum number of trains in service, while making repairs where they can be done most economically, Mr. Candee said.

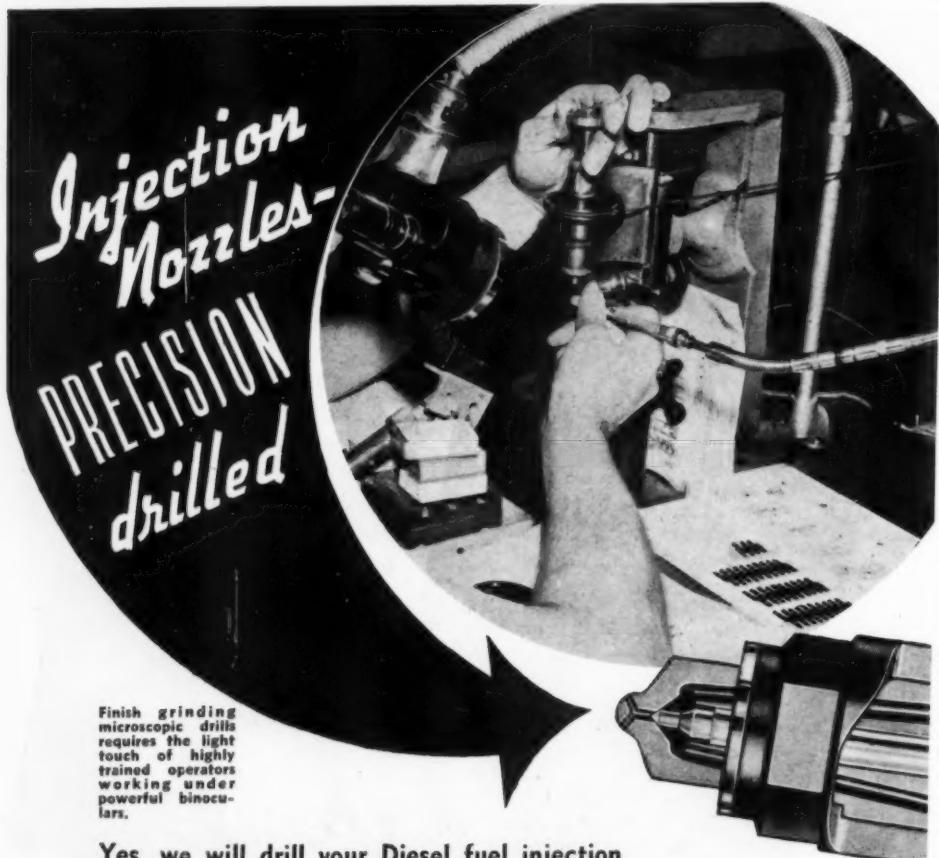
Future passengers on the train will ride with a minimum of noise and vibration, he added, since the Diesel engine and electrical equipment will be isolated from the passenger car in a virtually sound-proof compartment. A walled passageway around the engine will enable passengers to move easily and safely from one car to another.

"Power can be drawn from the unit as it is needed," Mr. Candee declared. "This means that besides driving the train, the power unit can supply all the electricity that is necessary for air-conditioning, modern lighting, air cleaning, water coolers and other electrically-operated conveniences. In addition, the power supply is increased in direct proportion to the number of units that are coupled, since each unit contains its own 'power package.' As a result, the train can travel at the same fast speed no matter how many cars are in the train. This can never be duplicated by a locomotive-hauled train."

Many suburban passenger cars now operating on American railroads could be adapted to this type of train, Mr. Candee pointed out. The use of a separate power cab means that these cars need not be scrapped, but can be converted to self-propelled trains at a minimum expense.

DeBothezat New York Office Moves to Woolworth Building

THE New York district offices of DeBothezat Fan Division, American Machine and Metal



Yes, we will drill your Diesel fuel injection nozzles for you exactly to specification, as we are doing for many Diesel engine manufacturers. Or we will supply you microscopic, long-lived, precision drills with super-sensitive drilling equipment, backed by skillful engineering service.

Consult with us on your small precision drilling and machinery problems.

The Only Business Of This Kind In the World

National Jet Company

115 MILTON PLACE CUMBERLAND MARYLAND

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AL PROGRESS

Inc., formerly located at 100 Sixth Avenue, New York City, have been removed to new headquarters in the Woolworth Building, 233 Broadway, effective July 25, according to A. Winkler Prins, district manager. The company, which maintains manufacturing plants in East Moline, Illinois, states that rapid increases in its sales and office staffs, as well as enlarged service facilities, necessitates the move to the nationally known and easily accessible Woolworth Building, where large space leased for a period of years will meet the requirements of the various divisions of the company.

Divisions of American Machine and Metals, Inc., are Troy Laundry Machinery Division, makers of power laundry and drycleaning equipment; Tolhurst Centrifugal Division, manufacturers of centrifugal extractors for the process, chemical and textile industries; DeBothezat Fan Division, producers of industrial fans and ventilating equipment; Riehle Testing Machine Division, manufacturers of physical testing machines and Trout Mining Division, producers of manganese, lead and zinc ores. A subsidiary, U. S. Gauge Company, will also maintain New York offices in the new headquarters of the parent company.

Diesel Tug "Kieth,"

continued from page 48

"Length of time operated at maximum rpm.—650 continuous 675—45 minutes.

"Diameter and pitch of propellers—52 x 36.

"Type of lubricating oil used—Standard Oil Co. RPM. Delo, SAE 30.

"Operating hours on lube oil between changes—300 hours.

"Average exhaust temperatures—780 to 850 degrees.

"Maximum exhaust temperatures—1000 to 1100 degrees.

"Number of pistons destroyed in operations—9.

"Average yearly maintenance cost—\$2,680.46.

"Has any general overhaul been done, or is most work done during the course of operation?

"All the work is done during the course of operation.

"Number of men in crew—Six plus one cook.

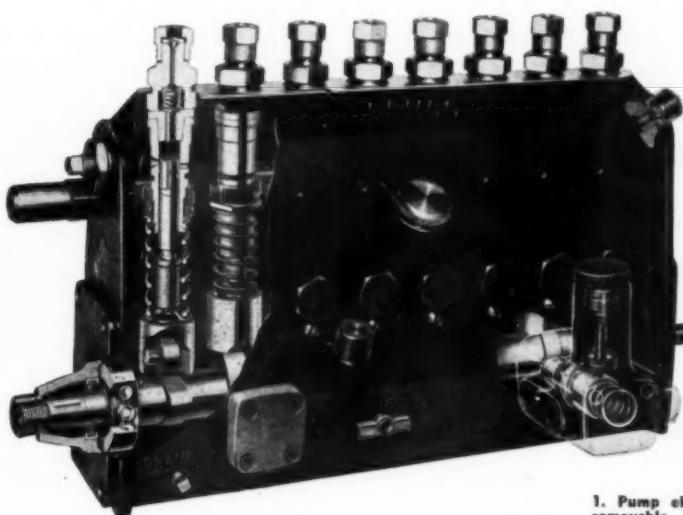
"Number and designation of men on watch—One pilot, one engineer, and one deckhand work six on and six off, making a total of six men necessary to operate the boat 24 hours a day, plus the cook.

"Temperature of river water—Winter—33 to 36 degrees. Summer—65 to 80 degrees.

"Outside air temperature—Winter—minus 30 degrees F. Summer—120 degrees F.

"General statement regarding number of gallons pushed up river by this boat as compared

NEW PUMPING UNITS INSTALLED WITHOUT NEED FOR RECALIBRATION



1. Pump elements are removable upwards without necessity of removing any other part of the pump.
2. Largest plunger 12mm. diameter.
3. Interchangeable with other makes.
4. Available with from three to eight pumping unit assemblies.

DEMCO Type "PB" Multiple-Unit In-line Pump

Servicing of the injection equipment in the field is greatly facilitated by the simplicity of the Demco Type "PB" Multiple-unit In-line Pump. The plunger and barrel (pumping unit) may be removed from the pump housing (upward) without necessity of removing the camshaft and tappets, as illustrated in the cut-away view above. A new plunger and barrel-assembly can be installed in the housing without requiring recalibration. These pumps are manufactured to exceptionally close tolerances and all external, or installation dimensions such as base, camshaft height, control rack location and movement, pipe connections, etc., conform to standard. Write for complete information on this and the complete line of Demco Pumps, Nozzles and Nozzle Holders.

DEMCO

DIESEL ENGINEERING & MANUFACTURING CORP.
200-214 NORTH LAFLIN STREET • CHICAGO, ILLINOIS

to all other boats operating on the river—During 1943 the *Keith* pushed a total of 215,118 tons up the river compared to a total tonnage of all remaining tug boats of 204,429 tons. In addition, the *Keith* did a considerable amount of general towage pushing dredges, drill barges, etc. up the river.

"It is interesting to note that the tug *Keith* has operated since February 8, 1943, till the date of this letter, April 23, 1944, for a total of 411 days or a total of 9,864 hours. During this period of operation, the tug *Keith* has run continuously. The only time either one of her two engines have been shut down has been for a few hours each month for changing the oil in these engines, and this oil change has been accomplished by shutting one engine down at a time between rapids and effecting the oil change while the boat proceeded down the river on the other engine.

"On April 10th of this year one of the pistons started acting up a little bit. We pulled the head off and upon pulling the piston out, we found that one of the rings had broken. This was corrected and the boat was back in operation in a couple of hours.

"In the writer's estimation, this is a record that I do not believe has been ever equalled by any Diesel craft.

"During the early part of our operation with these supercharged engines, we, of course, were unfamiliar with the tremendous power possibilities of supercharged engines. Consequently, we did a considerable amount of testing for our own satisfaction. The only failures that we discovered, and this only by overloading the engines way above their rated horsepower, was the inability of the aluminum pistons to withstand the excessive heat caused by overloading. During these more or less experimental eras, we lost a total of 9 pistons in our three engines. No other parts on the engines showed any undue strain. From these tests we discovered that it was necessary for us to keep our exhaust temperatures below 1100 degrees and if we continued to do so, we would have no piston trouble.

"During the past 14 months the *Keith* has run a strenuous schedule and her engines have been in constant operation. We are indeed very proud of her crew and her propulsion machinery which enabled her to set up this enviable record during these past months.

"It is, of course, very gratifying, to think back five years ago and know that *Enterprise* had the foresight and the progressiveness necessary to develop a supercharged engine. Without it, we would not have been able to have established

the performance records. At that time there were plenty of critics to criticize our mutual undertaking that the boat and its supercharged engines would be complete failures.

"Needless to say, we still believe in the good old saying, "Actions speak louder than words."

"Where's That Fire Extinguisher?"

New Decal Transfer Locates Plant Fire Equipment

THE cry of "FIRE" can be doubly terrifying to the employee who can't see or remember the exact location of the nearest fire extinguisher.

Many shops and factories, conscientious in providing modern extinguishing equipment, and training personnel in the latest fire-fighting methods, fail to properly mark the location of each extinguisher within the property area.

Painting and lettering of fire extinguisher signs on pillars, walls, or compartments, takes precious time and labor from already overburdened manufacturers. Realizing this, Randolph Laboratories, Inc., has developed a new extinguisher locator sign; a decal water-transfer that can be instantly placed above all extinguishers in the plant area.

This neatly printed in background the plant, enough so by machine application a

Locators for be obtained Randolph Street, Chi

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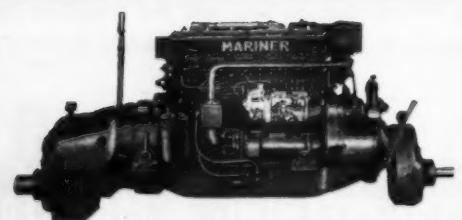
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MACK ALSO POWERS ARIEL



Mack
DIESEL MARINE
POWER



MACK MARINE ENGINES ARE A PRODUCT OF THE BUILDERS OF WORLD-FAMED GASOLINE AND DIESEL-POWERED TRUCKS, BUSES AND FIRE APPARATUS

• Gloucestermen know boats and engines—so it's no wonder that Captain Paul Woodbury picked a Mack for his "Ariel". He knows he can depend on it for dependable power—fair weather or foul—and he knows, too, that a Mack owner gets performance at rock-bottom costs!

With such a reputation for dependability, Mack is the choice of wise skippers not only in Gloucester, but along both coasts and the inland waters as well. To get that reputation, Mack engines are built to the highest standards in the industry—to give Mack users more engine, more work, more all-around satisfaction!

"Ariel" is a familiar sight in Gloucester harbor. This 54' x 14' x 6' dragger is powered by a 605W Mack Mariner Diesel, with a 3:1 reduction gear, and is one of the most successful boats on the Eastern coast.

MACK MANUFACTURING CORP.
Marine Engine Division
Empire State Building, New York, N. Y.



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This neatly designed 10-inch diameter locator, printed in large white letters on a bright red background, is visible for 75 feet in any part of the plant. Transfers should be placed high enough so as not to be obstructed from view by machinery or equipment. Directions for application are printed on the reverse side of the transfer.

Locators for all extinguishers in your plant may be obtained from the manufacturer. Write Randolph Laboratories, Inc., 8 East Kinzie Street, Chicago 11, Illinois.

Merchant Marine,

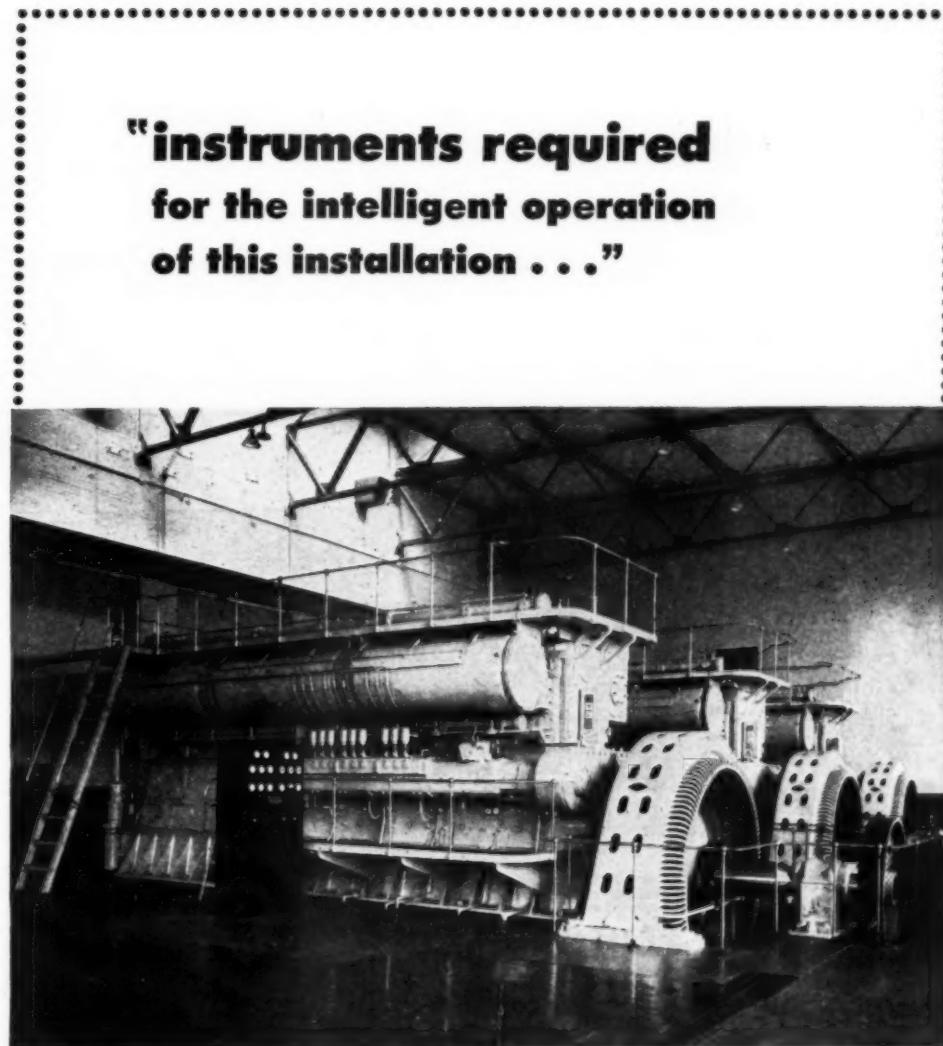
continued from page 74

Few realize that the materials used in the construction of a ship represent contributions from every state in the union. The work of millions of America's land bound citizens is represented in every ship that's launched.

The third ad entitled 'What Oklahoma Needed Was a Navy' reiterates the fact that a strong Merchant Marine fleet is as important to a citizen in the Middle West as it is to a citizen of the Atlantic Seaboard.

Other ads will continue this story. One, 'The South Would Be Sunk Without Ships,' will stress the importance of the Merchant Marine in the business of carrying cotton and other agricultural products to all parts of the world. Others comparable to these are in production.

The ads constitute only a small part of our complete campaign, though. There are other important factors which we will bring to bear on the problem of making John Q. Public take pride in his Merchant Marine. One of those factors is this pictorial map folder which we



Busch-Sulzer Diesel 3000 hp generating units at a Middle West utility plant. Alnor Exhaust Pyrometers are shown on the instrument panels.

Alnor Exhaust Pyrometers are one of the essentials to intelligent operation and maintenance of a Diesel installation such as this. The constant check of exhaust temperatures possible with Alnor Pyrometers is a reliable guide to efficient operation, correct adjustment and proper maintenance of Diesel or gas engines, afloat or ashore. There is an Alnor Pyrometer for any type of engine, large or small. Write for special Exhaust Pyrometer bulletin with data on all types of Alnor Pyrometers.

ILLINOIS TESTING LABORATORIES, INC.

420 NORTH LA SALLE STREET
CHICAGO 10, ILLINOIS

ALNOR EXHAUST PYROMETERS

will offer free in all the ads, in our radio broadcasts and through our contacts with educational institutions. This map, the final art work of which has just been completed, is one element of our effort which I think most likely to be enduring.

"We have tried to make the map educational in nature and factually correct so it will be of interest not only to the general public, but also to teachers and students in our schools and colleges.

"We think that this map selling the American Merchant Marine will find its way into millions of homes and schools throughout the nation. We believe this so strongly that our original printing run (barring hold-ups due to our inability to get paper), will be for 1,000,000 copies.

"Another tool we will use for reaching the general public is radio. We plan to make use of all three of the present Westinghouse national radio programs. These are the main guns in our advertising and publicity program which

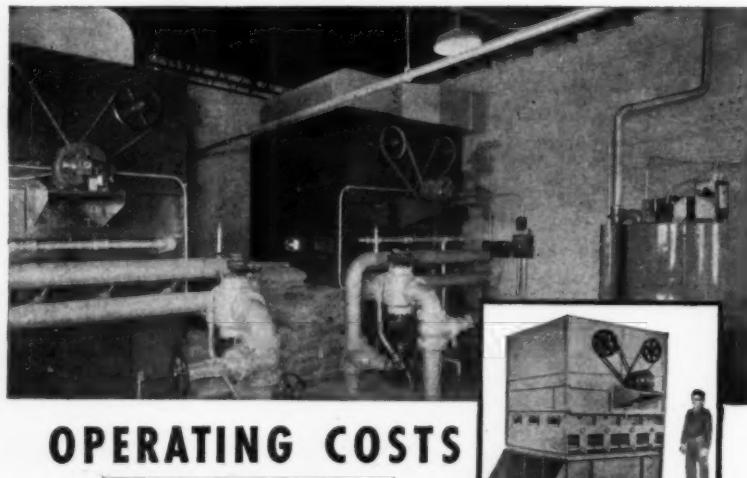
we hope will help the general public realize the stake it has in our Merchant Marine."

Norma-Hoffmann Elects F. W. Mesinger Vice President

NORMA-HOFFMANN Bearings Corporation at its Directors' Meeting on June 17th, elected Mr. Frederick W. Mesinger a Vice-president, succeeding Mr. H. J. Ritter who recently resigned. Mr. Mesinger takes up his new duties after some 24 years' connection with the firm's Engineering staff, and for the past 16 years has been District Manager of the New York office. He is a member of the American Society of Mechanical Engineers, of the Society of Automotive Engineers, and of the Army Ordnance Association; and he is an associate fellow of the Institute of Aeronautical Sciences.

Horine Returns to Mack To Head Sales Promotion

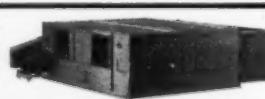
RETURN of M. C. Horine as Mack Sales Promotion Manager following his resignation from the War Production Board, has been announced by C. T. Ruhf, president of Mack Trucks, Inc. For the past year Mr. Horine has been research consultant to the director of the Automotive Division of the WPB with offices in Washington.



OPERATING COSTS REDUCED WITH EVAPORATIVE COOLING

This installation of two Young Evaporative Coolers in an Iowa Co-op electric plant, efficiently maintains proper engine jacket water temperatures for a battery of Diesel-generating units serving 2700 miles of lines. On a variety of special applications Young Evaporative Coolers have proved they are most economical closed system cooling units to operate when atmospheric temperatures are too high. Designed to cut water consumption to a minimum, they are extensively used to cool engine and compressor jacket water; to maintain temperatures below the ambient dry bulb in chemical processing and for gas cooling. Let Young Heat Transfer Engineering help you to lower operating and maintenance costs.

Young also makes "STREAMAIRE" factory and office Air Conditioning Units which incorporate all the recognized engineering and design features plus Young "Quality". Available in 8 ceiling suspension models (illustrated) and 8 floor models. Capacities range from 400 to 16,625 cfm. Write for Catalog No. 1541.



YOUNG

HEAT TRANSFER ENGINEERS

Manufacturers of Oil Coolers • Gas, Gasoline, Diesel Engine Radiators • Intercoolers • Heat Exchangers • Engine Jacket Water Coolers • Unit Heaters • Convectors • Condensers • Evaporators • Air Conditioning Units • Heating and Cooling Coils • Complete Line of Aircraft Heat Transfer Equipment.

YOUNG RADIATOR COMPANY, Dept. 234-H, Racine, Wis., U. S. A.
Distributors: The Happy Co., Tulsa, Oklahoma—A. R. Flournoy, Bell (Los Angeles), California—Wrightson Company, New York, N. Y.—W. P. Nevins Co., Chicago, Ill.—Calmes Engineering Co., New Orleans, La.—Export: Ameresco, Inc., New York, N. Y.

BUY BONDS
PRODUCE MORE
SALVAGE SCRAP
WIN THE WAR



**M. C. Horine, sales promotion manager,
Mack Trucks, Inc.**

During the period from February 1942 to June 1943, prior to his WPB appointment, he was engineering consultant to the Quartermaster General, continuing to serve the Chief of Ordnance in a similar capacity after motor transport was transferred from the Quartermaster Corps to the Ordnance Dept. Mr. Horine joined the Mack organization as an engineer in 1918 after serving as a second lieutenant during the first World War.

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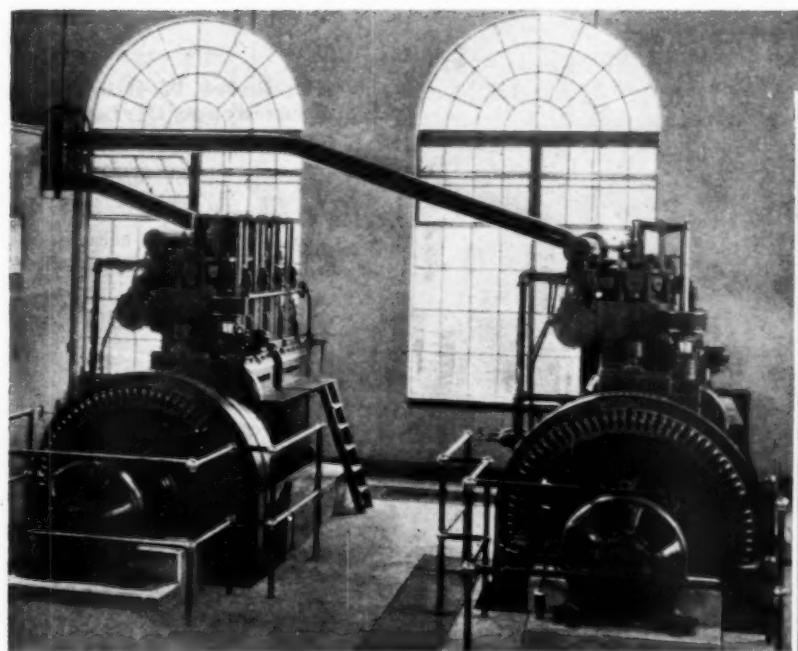
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A GREAT LITTLE CITY MAKES A TIDY PROFIT



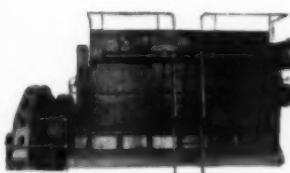
Two 4-cycle, 300 hp., mechanical injection, Worthington Diesels installed in Kenyon in 1932, and the latest addition, a 750 hp. Worthington unit which more than doubled plant capacity in 1941.

Civic Improvements in Kenyon, Minnesota, Result from 10 Years of Progress With Worthington Diesels

Kenyon, one of the best lighted, progressive little cities in Minnesota made \$146,757.28 net profit between 1932 and 1941 on its Diesel-powered municipal plant — thus paying for the entire investment in Worthington Diesels with a comfortable margin for other civic projects.

Worthington, your partner in power progress, both for economical power and for wider distribution of power-using equipment, invites you to consider these *typical* figures as an indication of what you also can accomplish with Worthington Diesels.

Write for "Ten Diesel Years at Kenyon, Minnesota," an article reprinted from a leading Diesel power publication. Worthington Pump and Machinery Corporation, Buffalo Diesel Engine Division, Buffalo, N. Y. District offices in principal cities.



10 YEARS—AND NEVER A STUCK RING!

Successful pressure lubricating system of Worthington Diesels contributes to low repair costs through the years. At Kenyon, each 300 hp. engine has run an average 5000 hours a year for 10 years, using the original valves, bearings and cylinder liners, and without a single breakdown or major repair.

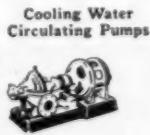
Power Progress in Kenyon, Minnesota

Average fuel return	11 kw. hrs. per gallon
Average annual engine repairs . . .	\$175
Total kw. hrs. generated	1,305,120
Total costs per kw. hr. 1941	1.84 cents
Average sale price per kw. hr. 1941 . . .	3.70 cents

WORTH BEHIND THE NAME
WORTHINGTON

YOUR
PARTNER
IN
POWER
PROGRESS

WORTHINGTON-BUILT AUXILIARIES



Evaporative Condensers



DE4-1

Diesel engines, 150 to 2,600
hp. . . . Gas Engines, 175 to
2,680 hp. . . . Convertible
fuel engines, 150 to 1,730 hp.

**Difference of Opinion Makes—
Progress**

**Four Railroaders' Opinions on Diesel
vs. Steam**

"**ALONG The Line**," New Haven Railroad's splendid magazine published monthly by and for employees and friends of the Road, sent its Inquiring Reporter out recently to ask this question: "Do you think Diesel locomotives will sound the death knell of the steam locomotive?"

We quote below the opinions of these four men

from the May issue of "Along The Line."

**James A. Croke, General
Foreman, Dover Street
Enginhouse:**

"Eventually, yes. The Diesel engine can, under pressure, remain in operation for 24 hours a day. The mileage for steam engines before turning in for shopping or repairs is between 35,000 and 40,000 miles, compared to the Diesel's 250,000 and 300,000 miles. Steam is designed for either passenger or freight service whereas Diesels are streamlined for both."

**Edward R. Fox, Chief
Dispatcher, Boston:**

"Yes. Diesels will eventually pass the steam locomotive, but not in our generation. I base my opinion on my observation of the efficiency of Diesel switchers making speedy short hauls in the local yards. They also save a vast amount of time and labor by not having to stop for coal and water."

**Frederick W. Dibblee, Trainman,
Providence Division:**

"Steam locomotives will always live in the hearts of the old-timers, like the old 'bicycle built for two,' but the Diesel engine I think eventually will pass the steam by sheer performance. At present the Diesel functions with smooth performance, fast pick-up and steady speed."

**Gilbert F. Waterbury, Hostler,
Cedar Hill:**

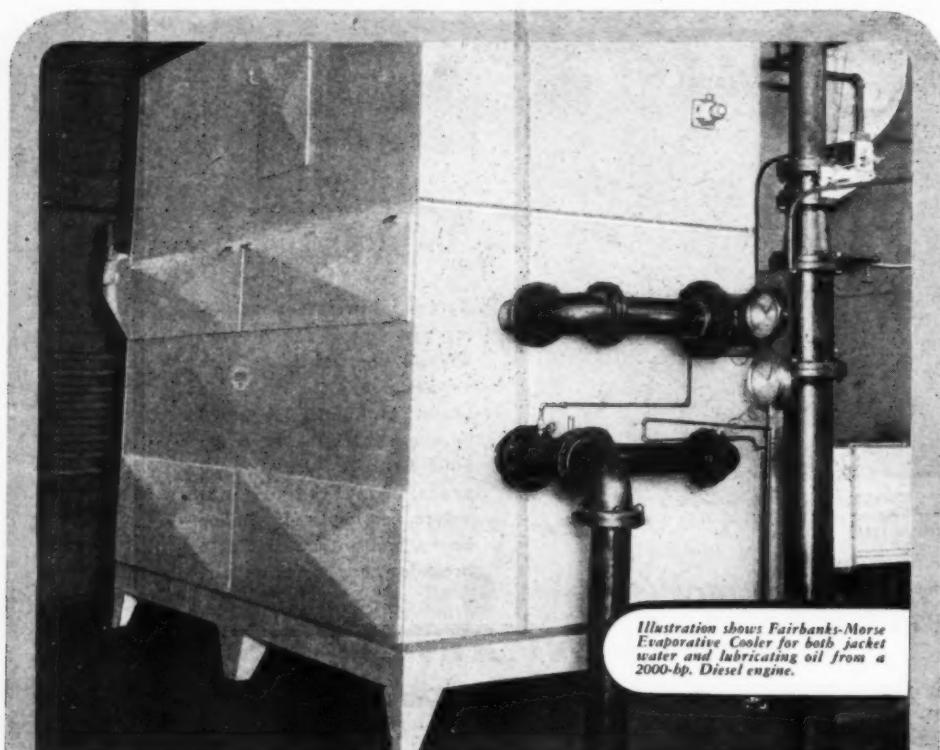
"I think steam locomotives will always be the backbone of the railroads. The old 'Iron Horse,' even at this stage, has never been fully harnessed to full capacity. Then, too, the initial cost of Diesel engines is far more than the cost of steam locomotives."

George M. Lange Joins Ex-Cell-O



George M. Lange, well known in the fuel injection field, has joined the staff of Ex-Cell-O Corporation in Detroit.

GEORGE M. LANGE is now with the Fuel Injection Division of the Ex-Cell-O Corporation, Detroit, Michigan. With the Timken Roller Bearing Company until joining Ex-Cell-O, he has been in Washington, D. C., for the past two years serving as a consulting engineer in the Office of the Deputy Vice-Chairman for Production, War Production Board.



PLAY SAFE!
**Improve Your Engine
Cooling System with a**
FAIRBANKS-MORSE
Evaporative Cooler

Don't take unnecessary chances on costly shutdowns!

Investigate—then install—Fairbanks-Morse Evaporative Coolers on your Diesel and gas engines. They assure you of longer engine life, fewer shutdowns, less repairs—more economical over-all performance and protection.

Fairbanks-Morse Evaporative Coolers save water—using actually only 5% of the amount generally required for a continuous water supply.

Write for complete information to Fairbanks-Morse & Co., Fairbanks-Morse Building, Chicago 5, Illinois.

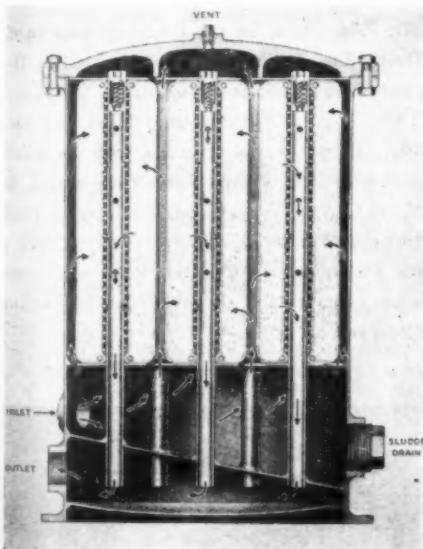


FAIRBANKS - MORSE
DIESEL ENGINES WATER SYSTEMS
PUMPS SCALES
MOTORS STOKERS
GENERATORS FARM EQUIPMENT
RAILROAD EQUIPMENT

Diesel Engine
Cooling
Equipment

Winslow Adapts Diesel Filters For Flushing Marine Gears

DEVELOPED as a war emergency method to hasten the delivery from shipyards of turbine powered vessels, a new method of flushing dirt from marine reduction gears is announced by the Winslow Engineering Company. Prior practice among the builders of reduction gears and at shipyards has been to flush out dirt, welding scale, metal chips and other foreign matter by circulating special flushing oils in the lubrication oil system, which frequently required a number of days of continuous circulation, since the strainers or centrifuges remove only the larger particles. With the Winslow Giant-Flo system, a battery of large capacity filters are inserted directly in the main lubricating oil line and the entire flow of lube oil circulated through the special Winslow filters.

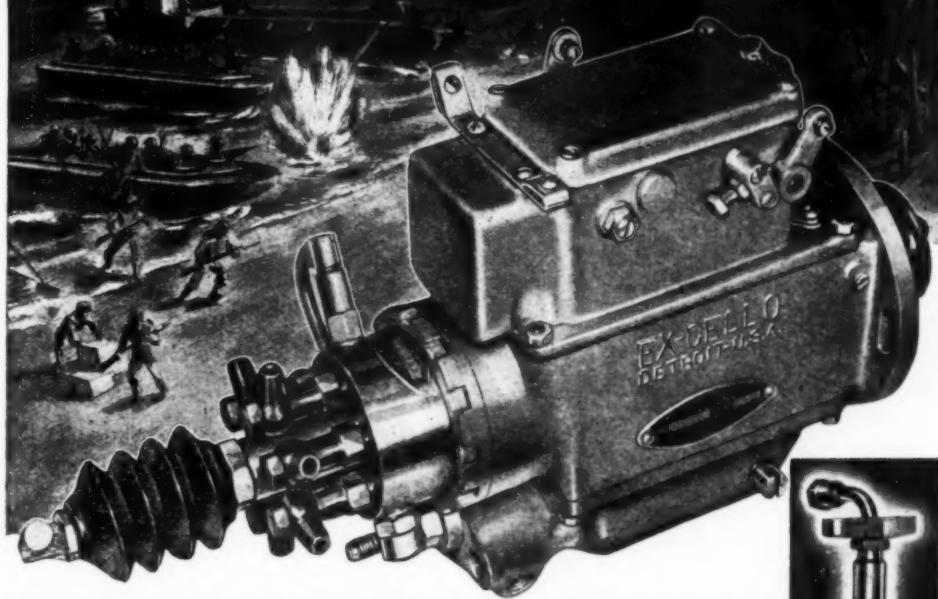


Cross section of Giant-Flo filter.

A typical installation to flush out turbine reduction gears at one of the Navy Yards consists of six Winslow Giant-Flo filters connected together in parallel by integral inlet and outlet manifolds. The cases that contain the filter elements are steam jacketed to raise the oil temperature to approximately 140 degrees F. An alternate method of oil heating is to use the heat exchanger that is normally used to cool the lubricating oil by removing the cooling water connections and running steam through the unit.

In each of the Winslow oil conditioners there are 57 individual filtering elements that give a total area of more than 4700 square inches. When pressure gauges indicate a back pressure of approximately 15 pounds the elements are replaced. The Winslow Flushing unit handles 75 gallons per minute of SAE 30 oil at 140

Automatic Fuel Injection Timing



This Ex-Cell-O Diesel Pump Feature Provides for Maximum Efficiency and Fuel Economy at All Engine Speeds

For variable speed applications such as Diesel-powered vehicles and motor ships, the automatic timing feature in the Ex-Cell-O type KB fuel injection pump provides for maximum power output and minimum fuel consumption by advancing fuel injection timing according to engine speed. Speed-responsive timing materially results in smooth, flexible operation throughout the operating range and increases the service life of vital engine parts. For applications not requiring automatic timing, the Ex-Cell-O type KD pump provides the same high degree of dependability and efficiency. Both of these war-proved pumps reflect Ex-Cell-O's quarter century of precision production and years of experience in the Diesel field.

The Ex-Cell-O nozzle is a worthy complement to Ex-Cell-O pumps, specifically designed for efficiency, dependability and trouble-free service.

For complete information, engine builders should address Diesel Division, Ex-Cell-O Corporation, Detroit 6, Michigan.



EX-CELL-O
DIESEL FUEL INJECTION
EQUIPMENT
EX-CELL-O CORPORATION - DETROIT

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PROGRESS

degrees Fahrenheit.

The Winslow oil conditioners used for flushing out gears and other machinery are an adaption of the unit that is designed primarily for Diesel engine lubricating oil conditioning. These are also of the full-flow type and each conditioner will handle 15 gallons per minute, which is sufficient for most engines up to 400 hp. Larger volumes are handled by paralleling two or more model 7-1645 units, when the entire volume of oil is to be passed through the conditioners. An alternate method is circulate only a portion

of the oil through the Winslow unit. In this model there are seven filter elements, each provided with a pressure actuated by-pass.

A bulletin describing the Winslow Giant-Flo Flushing system has just been issued by the Winslow Engineering Company and copies are available upon request.

Norris H. Schwenk Elected Busch-Sulzer President

BUSCH-SULZER Bros. Diesel Engine Company recently announced that Norris H.

Schwenk had been elected to the presidency of the company and has taken over the work and responsibilities of that position. Mr. Schwenk's record in the business world includes executive positions with William Cramp & Sons Ship & Engine Building Company, also with Pelton Waterwheels Company and De La Vergne Engine Company, both of which became associated with the Baldwin Locomotive Works of which Mr. Schwenk was a prominent officer for many years. The company of Mr. Schwenk's new affiliation expresses confidence in its continued advances under his able management.

Helps small engines OVER THE HUMP

Through the installation of a Twin Disc Torque Converter*, you can often make use of an internal combustion engine whose torque characteristics would otherwise be inadequate for the maximum requirements of your job.

For example: Added torque is required to start or lift excessively heavy loads. The Twin Disc Torque Converter, by multiplying the engine's torque (five times its normal at stalling), provides the extra torque needed to help the smaller engine over the hump. Once the job is running, the small engine can easily keep the load going.

Thus, by using a Twin Disc Torque Converter, you save in original engine cost, eliminate extra weight, and assure better performance because, in addition to helping the engine over the hump, the Twin Disc Torque Converter cushions out all shock loads and torsional vibrations. Bulletin 135-A tells the whole story. Why not send for your copy today? **TWIN DISC CLUTCH COMPANY**, Racine, Wisconsin (Hydraulic Division, Rockford, Illinois).

*Lysholm-Smith type.

Meeting the test and proving itself on the battle-fronts—the Twin Disc Torque Converter (Lysholm-Smith type) will come out of the war a veteran—ready for your heavy-duty, peace-time applications. For advance specifications ask for Bulletin 135-A.



A. Winkler Prins

Mr. Prins assumes his duties as district manager of American Machine and Metals, Inc., in their new offices recently moved to the Woolworth Building in New York City. He will supervise the sales and service activities of his company for their Troy Laundry Machinery, DeBothezat Fan, Riehle Testing Machine and Tolhurst Centrifugal divisions.

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Did you put My Son on the Streets?



Dirty looking little fellow, isn't he? And did you ever hear such language? What kind of parents must—

Just a minute, please—that's what we wanted to talk to you about. Because we happen to know Bobby Greenleaf's Mom and Pop . . . You know them, too.

When Brad Greenleaf shipped out, he left behind the two most important people in the world... his young wife Ann and tow-headed, ten-year-old Bobby. They were a nice family—the kind of folks you'd like to see moving in next door.

It wasn't so bad for a while. But then costs began to creep up... slowly, insidiously. Ann cut corners where she could in her cheerful suburban cottage. But finally she was forced to move into a section of the city where rents were low, lawns didn't have to be cut, and houses heated.

Dirty looking, isn't he? He spends his time hanging around the candy store, watching the older boys shoot dice, dodging cars while he plays ball in the street.

"School will open soon", Ann sighs with relief. But everything costs more, and schools are feeling the pinch. The playground has been closed... no one could be employed to supervise it. And the workshop where Bobby might learn to build a wobbly table for Mom—that won't be open this year.

What have you got to do with it?

Not much... and yet, perhaps everything. Did you add a little extra on that railroad ticket when you just had to have a reservation? Did you rent your house this summer for three times what you got last year? Did you whisper to the butcher that if ceiling prices stood between you and a choice sirloin, you'd be glad to...

Sure—sure, they're small things. But any violation of price control or of normal business dealing reduces the purchasing power of the few dollars Ann gets as a soldier's wife. Schools, libraries, hospitals—all institutions and individuals operating on a fixed income must cut down to survive when the dread drive of inflation forces prices higher and higher, out of reach of needy hands.

No, of course you didn't put Brad Greenleaf's boy on the streets, while he was off fighting your war. And it won't happen if you can do anything about it.

You can. Will you?

PLAY FAIR WITH AMERICA'S CHILDREN—KEEP PRICES DOWN! DO THESE THREE THINGS—
Encourage our representatives in Washington to tax our extra income away. Hard, yes, but not as hard as inflation and saddling our children with War's cost.
Follow the price control rules. Sure the government agencies have made mistakes. But they're the best we've got and they can do the job if we support them.
Save—invest in War Bonds for America's post-war future and your own. The suckers are the ones who are spending—not the ones who are saving. Think that through.

ROGERS DIESEL AND AIRCRAFT CORPORATION

1120 Leggett Avenue, New York 59, N.Y. Builders of diesel-electric equipment and aircraft parts for our armed forces. Divisions: Hill Diesel Engine Company, Edwards Company, Edwards Aircraft Products, Inc., Ideal Power Lawn Mower Company.



TRADE MARK REG.

Diesel Engines, 5 to 2000 h.p. • Gasoline Engines • Generator Sets • Generators • Power Units
Switchboards • Pumping Units • Hydraulic Aircraft Equipment • Recoil Mechanisms • Power Mowers
Power Brushes • Snow Removal Equipment • Streamlined DeLuxe Railway Motor Trains • Diesel Locomotives

COMPLETE REPRINTS of this message for poster use will be supplied upon request, subject to the limits of our paper allotment.

Largest Multiple Engine Drill Rig Diamond Roller Chain-Equipped

ONE of the largest drilling rigs in existence, that developed by National Supply for Superior Oil Co. of Los Angeles, requiring well over 1000 hp. for main power employs four oil engines tied together with totally enclosed Diamond Roller Chain Drives. These highly successful chain drives, being essential elements in the achievement of desirable flexibility in power application through the use of multiple engines, are the result of Diamond Chain pio-

neering in the oil field and close engineering collaboration with the designers and builders of this rig. This noteworthy installation was described under the caption, "Mr. Big In Petrol," in the June DIESEL PROGRESS.

Al T. Hudson Joins Petroleum Solvents

THE Petroleum Solvents Corporation announce that Al T. Hudson has joined its staff and is now operating under Stafford Jones, District Manager in the Southwest.

Diesel Users Find Hydraulic Puller A Time Saver on Tough Jobs

USERS of Diesels will be interested in the jobs of pulling, pushing and lifting the Simplex Jenny Center Hole Hydraulic Puller is capable of doing. This powerful tool, developed and introduced by Templeton, Kenly & Company, has been on the market a comparatively short time, yet it has already acquired an enviable reputation for doing, in minutes, production, maintenance, and repair jobs that normally took hours.

Not only does the Simplex Jenny pull, push and lift but it can be readily rigged as a portable press and can be used as a conventional jack. This self-contained unit operates vertically or horizontally without the need of heavy auxiliary equipment, and without side thrust or friction. The Jenny is its own back-up and is self-supporting because of its center hole construction.

THE YOUTH OF TODAY... ..THE MAN OF TOMORROW

Since 1919 Guiberson has pioneered in the production of oil tools, oil heating units, aircraft parts and Diesel engines.

Guiberson U.S.A.
THE GUIBERSON CORPORATION
GUIBERSON DIESEL ENGINE COMPANY
DALLAS TEXAS

Set-up of Simplex Jenny for removing a large wrist-pin

It is especially valuable for inserting and removing wrist pins, pulling valves and cylinder liners and pulling keys. The illustration shows a typical wrist pin removal job. The strong back is mounted on one side of the piston and a piece of tubing, (smaller in diameter than the wrist pin on the other side). A ram is secured to the strong back and run through the wrist pin, tubing and Jenny and secured at the ram end of the Jenny. Pumping the Jenny then quickly pushes the wrist pin out.

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AUGUST 1944

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DIESEL PROG

A reverse job installs it. In some pulling jobs, the rod can be torch welded to the member being pulled. Other applications are found when a cable is used as the pulling medium.

Five sizes of Jennies are available of from 30 to 100 ton capacity. The light weight of the unit in proportion to its capacity is a feature much appreciated by operators. Three of the models have single pumps and two have high and low speed pumps that can be operated separately, alternately or together.

The use of hollow steel rods is recommended since the Simplex Jenny will stretch, or pull apart any mild steel rod that will fit the center hole. The Jenny is built of heat-treated alloy steels to withstand heavy loads and service abuse. Each unit is tested for 50% overload before shipment.

Bulletin No. 43J which describes the Jenny in detail will be sent on request addressed to Templeton, Kenly & Company, 1020 S. Central Ave., Chicago, Illinois.

Ex-Cell-O Observes Silver Jubilee



Phil Huber, President and General Manager of Ex-Cell-O Corporation, Detroit, which observed its 25th anniversary on July 10. Mr. Huber was one of the founders of the company.

DURING the month of July, Ex-Cell-O Corporation observed its Silver Jubilee. This milestone in the growth of the company was marked by distribution of a sixty-eight page brochure entitled, "The First 25 Years," an impressive presentation of its history, organization, plant and products, also a view to the future.

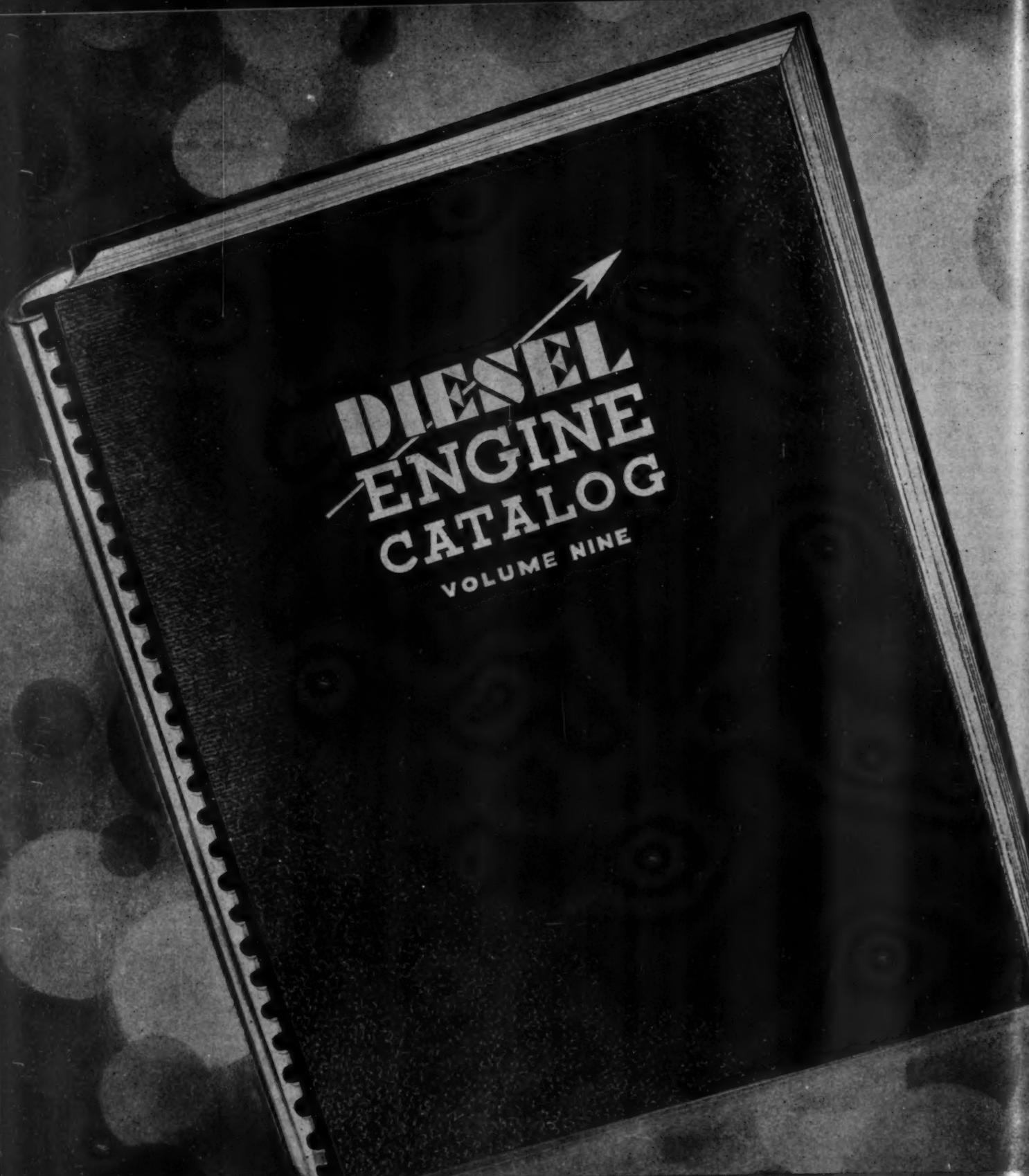


WESTON all-metal thermometers are used at critical checking points!

At this new Cities Service refinery the familiar, legible faces of WESTON temperature gauges appear at hundreds of critical checking points. Here, too, their selection was based not alone on the extreme legibility of their boldly marked gauge-type scales, but also on their *proved* all-metal temperature principle. This all-metal construction contributes extreme ruggedness, of course; but it also enables these thermometers to maintain their high initial accuracy *far longer* . . . because of the absence of gases, liquids, capillaries, and other troublesome parts.

WESTON all-metal temperature gauges are available in various sizes and stem lengths for industrial applications . . . as well as in models for laboratory use. Ask for literature today . . . Weston Electrical Instrument Corporation, 655 Frelinghuysen Ave., Newark 5, N. J.

WESTON *All Metal*
TEMPERATURE GAUGES



DIESEL ENGINE CATALOG

VOLUME NINE

The Ninth Edition of the **DIESEL ENGINE CATALOG**, edited by Rex W. Wadman, is now available. This is not a reprint of previous volumes—the book has been completely revised and now contains descriptions and detailed specifications of over Two-Hundred and Ninety-five engines—profusely illustrated. Color is freely used to trace fuel, lube, and cooling systems. Nothing like it published. A large section is devoted to equipment associated with Diesel installation and operation and there is a directory of Diesel Engine and Accessory manufacturers. The most useful Diesel book available—widely used by those who specify and buy Diesels and accessories as well as by engineers in all fields of power application. An indispensable book for all who want to know Diesel engines and their applications.

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Borg-Warner Appoints Harold T. Youngren

THE appointment of Harold T. Youngren as Director of Engineering Development of Borg-Warner Corporation, effective July 1, has been announced by C. S. Davis, president. He has held the position of Chief Engineer with Oldsmobile division of General Motors Corporation since 1933.



Harold T. Youngren

Mr. Youngren was executive engineer in charge of passenger car chassis design for Studebaker when he joined General Motors in 1929. Previously his engineering experience, which began in 1910, included jobs with Allis Chalmers, Westinghouse, Harley-Davidson, and the Pierce-Arrow Motor Car company. During World War One he was employed by Curtiss Aeroplane and Motor Corporation at Buffalo and Garden City, New York, as an experimental designing engineer on airplanes and engines.

An active member of the Society of Automotive Engineers for more than 30 years, Mr. Youngren will use Chicago as headquarters. One of his chief duties, it is understood, will be supervision of Borg-Warner research laboratories and he will cooperate with the plant engineers of the 20 Borg-Warner divisions and subsidiaries. These maintain their individual laboratories and one of them, PESCO Products of Cleveland, is just completing what is considered to be one of the most modern research departments in the aviation industry. The corporation itself has laboratories at Detroit and in Rockford, Ill.

Ralph Shelly Joins Perfect Circle

RALPH A. SHELLY, formerly with the Chrysler Corporation of Canada, has become a

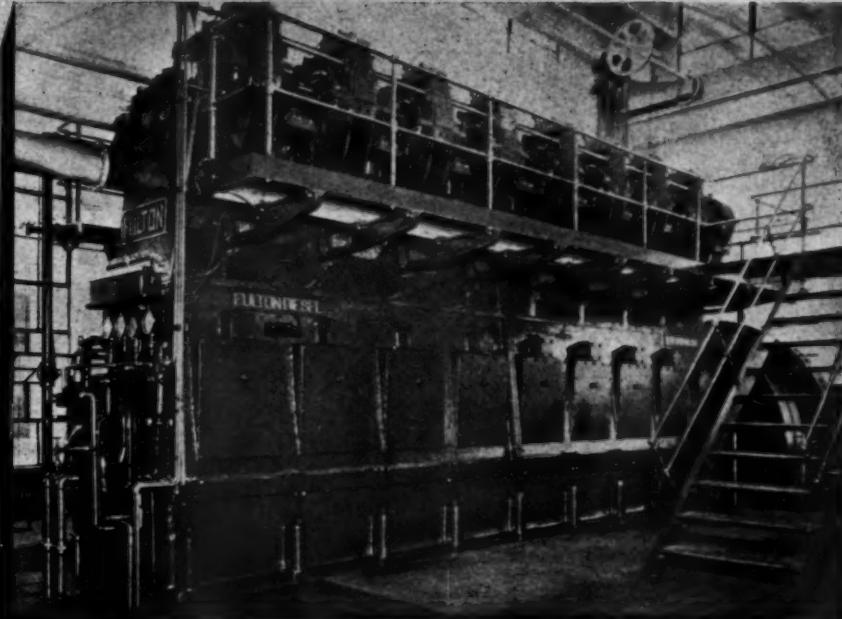
part of the Perfect Circle sales organization as announced by R. M. Thomas, Sales Manager, Manufacturers Division. Mr. Shelly has been appointed Replacement Sales Manager of the same division which was known formerly as the Standard Equipment division. He will be located at the company's home offices at Hagers-town, Indiana.

Following his graduation in Mechanical Engineering at Kansas State University, Mr. Shelly began at once to devote his business life to the

automotive industry, at one time having a Buick-Cadillac Agency at Atchison, Kansas. Prior to this he held positions with the Buick Motor Co., Dort Motor Co., and the Commerce Truck Co.

Going to Canada in 1928, he became Service Manager, DeSoto Division, then Assistant Sales Manager, Dodge Division of Chrysler Corporation. In 1934 he was made Merchandising Manager of the Chrysler Corporation of Canada and held this position until joining Perfect Circle.

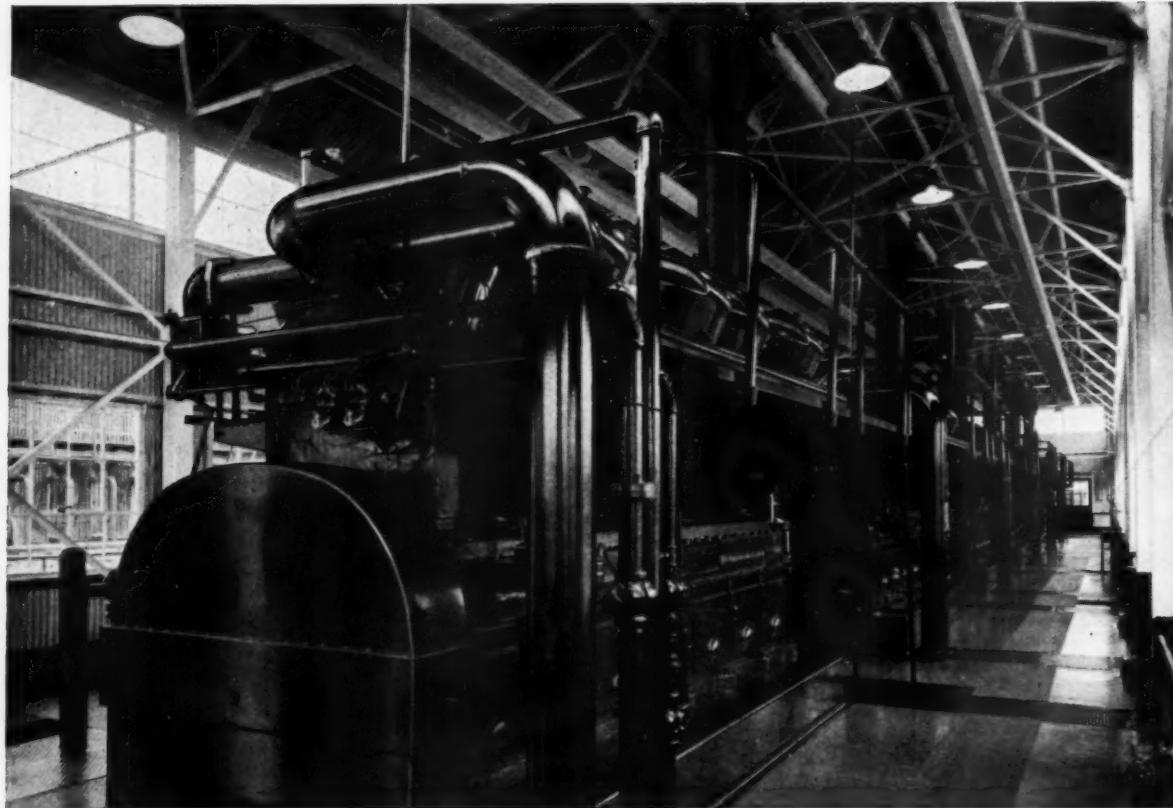
SUCCESSFUL ENGINE BUILDERS
1852 FOR 92 YEARS 1944



Ninety-two years is a long time — yes, not far from a century of Engine Building Experience — to back up the Fulton Diesels we shall build for the peace-time World. In better than nine decades we have learned how to design and build Diesels for long, carefree, dependable and profitable service — with nothing left to guess work. These characteristic qualities of Fulton Diesels have been demonstrated in practically every type of stationary application — continuously for many years.

625 H.P. to 2000 H.P.

FULTON IRON WORKS CO.
ST. LOUIS · MISSOURI

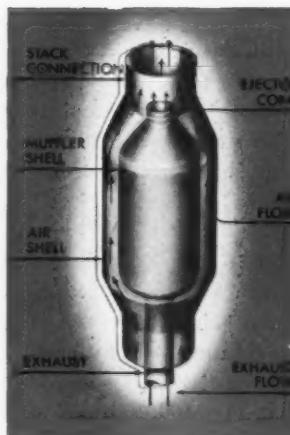


Take the brakes off your HORSEPOWER!

Back pressure due to improper muffler design is the invisible brake on horsepower which cuts engine efficiency and increases operating costs... whether you realize it or not. It can cost you many times the price you paid for the muffler itself.

You get full, rated engine power when you install FLUOR Air-Cooled Mufflers because they are designed to operate with minimum back-pressure. This unique design effectively traps reflected pressure waves and maintains lower engine exhaust pressure at the critical period of the engine cycle. This maintains lower engine exhaust temperatures in the cylinder itself, thus prolonging engine life.

All designs for FLUOR Air-Cooled Mufflers are fully protected by U. S. Patents and Patents Pending.



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ENGINEERS • MANUFACTURERS • CONSTRUCTORS

PROCESS PLANTS AND EQUIPMENT FOR THE OIL, GAS AND ALLIED INDUSTRIES

THE FLUOR CORPORATION, LTD., 2500 SOUTH ATLANTIC BLVD., LOS ANGELES 22 • New York, Pittsburgh, Kansas City, Houston

Major Engine Builders
have recognized
SEALED POWER SUPERIORITY
for over 30 years

THROUGHOUT more than 30 years of Sealed Power progressing facilities without equal in the development of laboratory and manufacturing facilities throughout the industry—major engine builders have indicated their preference for Sealed Power products.

These facilities and the experience of Sealed Power engineers are at your disposal, to help make your good Diesel engines even better.

SEALED POWER CORPORATION
Muskegon, Michigan • Windsor, Ontario

BUY MORE WAR BONDS



SEALED POWER PISTON RINGS

PISTONS — CYLINDER SLEEVES

Fourth Star Awarded to Cleveland Diesel Division

THE fourth star on its Army-Navy "E" burgee has been awarded to the Cleveland Diesel Engine Division of the General Motors Corporation. In the letter awarding the citation, Rear Admiral C. C. Bloch USN (Ret.) said the fourth star is awarded for a period of one year because of a "production record established and maintained since the time that the original Army-Navy 'E' was granted." The first award was made in May 1942.

George Codrington, Vice-President of General Motors and General Manager of the Cleveland Diesel Engine Division said that in compliance with the wishes of the Navy there would be no ceremony. However, in commenting on the award, Codrington stated that "every man and woman at Cleveland Diesel as well as the ninety four thousand men and women of our subcontractors and suppliers can rightfully take personal pride in this recognition by the Navy. The "E" award means excellence in production and quality and this team of ours has delivered

to the Navy engines in great quantity combined with excellent workmanship."

He also revealed that the Cleveland Diesel Engine Division is carrying on an extensive replacement parts program for the Navy. "Today almost 10 per cent of our total dollar volume of production is for replacement parts necessary to protect the Navy against damage due to combat," Codrington said. It was also pointed out that in the first four months of 1944 more replacement parts had been delivered to the Navy than in all of 1942.



JUST a touch of the button or a pull on a lever . . . that's all it takes to start a Diesel equipped with electric starting. And if the starting batteries are Globe Spinning Power, with Perma-Set Plates, electric starting is as efficient and trouble-free as the starting on your automobile . . . as dependable and economical as Diesel performance itself.

If you are looking ahead, talk with a Globe engineer. Address nearest factory.



GLOBE-UNION INC. • Milwaukee 1, Wisconsin

ATLANTA • BOSTON • CINCINNATI • DALLAS • KANSAS CITY • LOS ANGELES
MEMPHIS • MINNEAPOLIS • PHILADELPHIA • SEATTLE
Dept. D.P.-844

New Marine Diesel Catalog Issued by Enterprise

THE Enterprise Engine & Foundry Company, San Francisco, has just issued their 1944 Marine Diesel Engine Catalog No. 173, containing 20 pages of text and illustrations of the company's Diesel engines which range from 225 hp. through to 2100 hp.

Many new features are incorporated in the new catalog including an article on the advantages of supercharging and turbocharging. Enterprise Diesels are classified in three main divisions with all the engines in each division employing the same essential cylinder sizes. The largest class is the "Q" group made in both six and eight cylinder models with 16 in. pistons and 20 in. stroke. These are low speed medium duty engines with horsepower outputs ranging from 500 hp. to 2100 hp. at speeds varying from 200 rpm. to 420 rpm. The Enterprise "G" engines are also made in six and eight cylinder models.

American Locomotive Vice President Sees Great Future For Diesel Locomotives

POST-WAR locomotives of radically different design from the steam and Diesel plants in use on railroads today were recently envisioned by James E. Davenport, Vice President, American Locomotive Company.

In addition to greatly improved Diesel-electric and steam locomotives, Mr. Davenport predicted the development of locomotives powered by Gas Turbines.

Such engines, operating on the same principle as war-developed jet propulsion airplanes and superchargers for high altitude flight, are expected to burn low cost fuel, to operate at high efficiency and to produce a high horsepower output in proportion to weight, he said. Steam locomotives, operating on the turbine principle instead of with the conventional cylinders and side rods are another promising development.

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development

according to Mr. Davenport. These ultra-modern versions of the Iron Horse, however, will have to prove their worth in comparison to greatly improved steam and Diesel locomotives.

"The most significant development in motive power during the past ten years has been the rapid emergence of the Diesel locomotive," Mr. Davenport pointed out, citing the fact that whereas ten years ago there were only 100 Diesel locomotives in use on American railroads, all of them switchers, "today there are over 4,000 Diesel locomotives on order or in service, 800 of which are road locomotives."

The Diesel locomotives which will haul tomorrow's freight and passenger trains, will be far more powerful units, weight for weight than today's streamliners, as a result of more efficient engines developed out of war-time experience.

Graver Tank & Mfg. Co. Elects J. E. Swanson Vice President

MR. E. N. GOSELIN, President of Graver Tank & Mfg. Co., Inc., East Chicago, Indiana, recently announced the election of Mr. J. E. Swanson as a Vice President of the company, by the board of directors at their annual meeting on June 6.



J. E. Swanson

Mr. Swanson, who has been with the company for more than twenty-five years, has served in various executive capacities for the organization, having most recently held the position of General Manager of Sales. His election as a Vice President of Graver will be of interest to his many friends and associates throughout the entire steel, chemical and petroleum industries.

Henderson Named Rural Electrification Coordinator

F. H. STOHR, manager of Industry Departments on the Westinghouse Electric and Manufacturing Company, has announced the appointment of J. S. Henderson as coordinator of rural electrification for those departments.

A veteran of many years' service in the Westinghouse Industrial and Central Station Departments, Mr. Henderson, in cooperation with the separate industry departments and appa-

ratus divisions, will be responsible for the development of rural business with the Rural Electrification Administration, private utilities, farm equipment manufacturers, and distributors. A native of Salisbury, North Carolina, Mr. Henderson was graduated from the University of North Carolina with a Bachelor of Arts Degree. He is a member of the American Institute of Electrical Engineers. Mr. Henderson, his wife, two daughters and three grandchildren reside at 265 Thorn Street, Sewickley, Pennsylvania.

**PRECISE
PRECISION**

Precision in production and testing has been traditional with The Chicago Screw Company for over 72 years . . . Machining and grinding on modern precision equipment designed and built to maintain the closest production tolerances, plus inspection after each operation on the latest type gauging devices—adds up to a uniformly accurate product . . . Tests and checks start with the raw material in our modern metallurgical laboratory, and extend throughout all secondary operations . . . If you are using hardened and ground screw machine products, in any quantity, we are here to serve you.

THE CHICAGO SCREW CO.
1026 So. Homan Avenue • Chicago 24, Ill.

Goodrich Offers V-Belt Handbook

A NEW 44-page handbook on industrial fractional horsepower V-belt drives has just been published by The B. F. Goodrich Company. The booklet notes the trend toward larger sheaves in both fractional horsepower and multiple V-belt drives, describes the construction of B. F. Goodrich fractional horsepower V-belts and gives price and data on both sheaves and belts.

One of the most valuable portions of the handbook is the chapter on proper selection of FHP belt drives, with formulas, together with a page on how to get the most service from V-belt drives. Horsepower ratings and general engineering data of these drives are given, together with selection tables of stock drives using pressed steel and cast iron FHP single groove sheaves. Twenty-seven pages are devoted to these tables. The handbook is available upon written request to The B. F. Goodrich Company, Akron, Ohio.

Electric Machinery Appoints R. H. Olson

R. H. OLSON, who has been manager of the New York district office of Electric Machinery Mfg. Company, has been appointed to the position of vice president in charge of sales, with headquarters at the company's home office in Minneapolis.



R. H. Olson

Mr. Olson began his E-M sales career in 1919 after graduation from the University of Minnesota, at the Minneapolis district office of Electric Machinery. In 1925 he went to St. Louis as district manager, and in 1930 he became district manager at New York. Mr. A. P. Burris will take over the duties of district manager at New York for Electric Machinery to fill the vacancy created by Mr. Olson's elevation to vice presidency.

accept no substitute for the DELUXE CARTRIDGE

MAKE SURE YOU GET DELUXE
THE ONLY CARTRIDGE WITH THE SPRING!

Illustration above shows how the DeLuxe Spring prevents cartridge collapse from pressure or from contraction due to presence of oil. At left, is photo of a DeLuxe cartridge ready for replacement. Note that there is no collapse.

Opposite illustration shows, when other cartridge is without automatic spring. The compression which has taken place impedes the flow of oil and the absorption of contaminants. At right, is a photo of unsupported cartridge taken by DeLuxe Filter.

Only when genuine DeLuxe Cartridges are used in a DeLuxe Filter can you expect to get the full benefit of DeLuxe Oil Cleansing performance. The Spring, which assures the maintenance of proper density in the cotton cartridge, and the Cone which distributes the oil flow uniformly through the cartridge, are integral built-in elements in every DeLuxe Cartridge. For full facts, write for FREE BOOKLET. Address The DeLuxe Products Corp., 1416 Lake St., LaPorte, Ind.

DELUXE
Oil Filter
DOES MORE THAN STRAIN OIL... MORE THAN FILTER OIL
ACTUALLY CLEANSES OIL

TWO of these 44-ton Diesel-electric road switching locomotives were delivered recently to the Western Maryland Railroad by the General Electric Company. These locomotives are the first of this size to be put into service on this system, although it operates four older Alco-GE Diesel-electric road switchers—one 660 hp., and three of 1000 hp.

104

AUGUST 1944
DIESEL PROGRAM

manager of
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TYPICAL DIESEL LUBRICATION PROBLEMS:

3. Ring-Sticking

Ring-sticking usually results from deposits formed by the combination of the residues of oxidized lubrication oil and fuel with fuel soot.

In four separate ways, RPM DELO prevents the formation of these deposits:

1. RPM DELO is manufactured from a carefully selected base oil containing natural inhibitors highly resistant to oxygen. It contains no heavy residues which may be left behind to act as a binder for the fuel soot.

2. RPM DELO contains an added oxidation inhibitor which greatly reduces the rate at which the oil absorbs oxygen.

3. RPM DELO has chemical detergent properties. The compounding material reacts with the oxyacids to render them essentially inert so that they are no longer able to polymerize to form gums and lacquers.

4. RPM DELO has peptizing properties which enable it to maintain soot and oxidation products in suspension in minute particles. This prevents these materials from settling from the oil and forming engine deposits.

RPM DELO, moreover, is non-corrosive to all types of bearings, does not foam and has very high metal adhesion qualities at both high and low temperatures.

RPM DELO is marketed throughout the United States and many foreign countries under the following names: RPM DELO, Caltex RPM DELO, Kysco RPM DELO, Signal RPM DELO, Sohio RPM DELO, and Imperial-RPM DELO (concentrate).

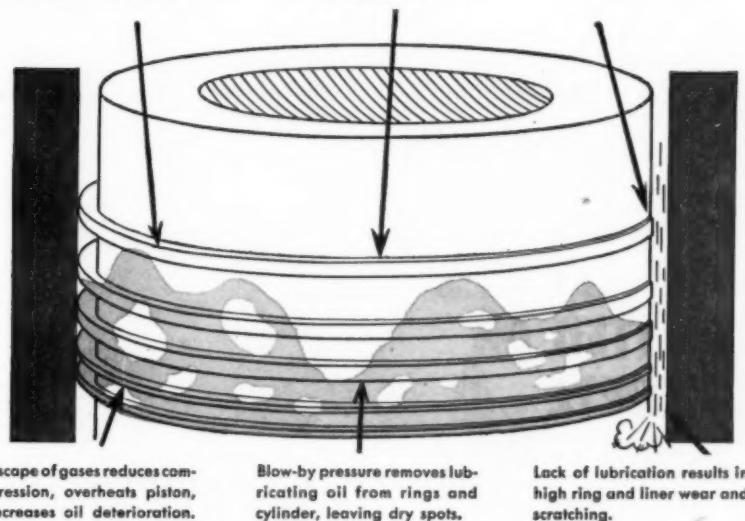


HOW RING-STICKING OCCURS

Decomposition products of fuel and lubricating oil deposit in ring groove, behind ring and in side-clearance space.

Rings stick in grooves, no longer expanding to form tight seal between piston and cylinder wall.

With seal broken, hot, high pressure gases "blow-by" stuck ring.

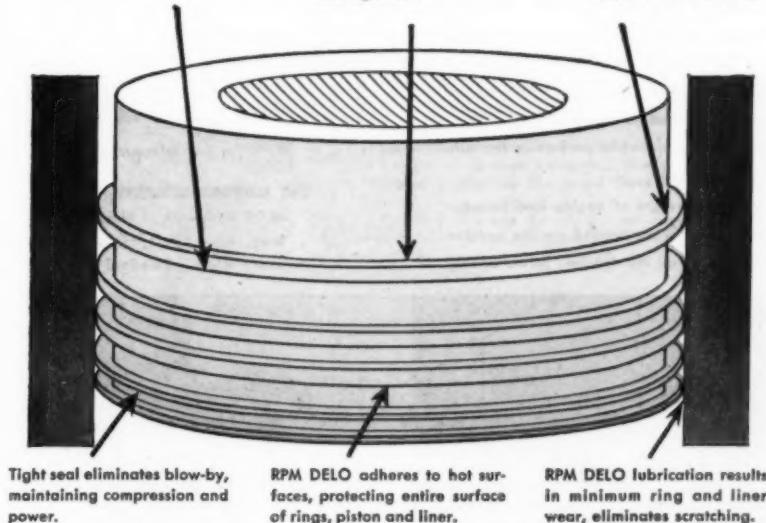


HOW RPM DELO PREVENTS RING-STICKING

Detergent in RPM DELO prevents deposition of oxidation products.

Ring grooves are kept clear, allowing ring tension to maintain tight seal.

RPM DELO clings to ring surface, maintaining lubricant film and seal.



STANDARD OF CALIFORNIA

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Maryland

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DIESEL PRO

AUGUST 1944

Navy Has Goal of More Than 100,000 Landing Craft Now, With All Major Types Developed In War Experience

WITH all the major types of landing craft now developed, the potential goal of the United States Navy—in the light of current Congressional authorization—is 100,000 of these necessary vessels, which have made possible the landings on the coast of Western Europe and in the Pacific campaigns. The newest program will bring total expenditures for this phase of Naval shipbuilding up to nearly \$6,000,000,000. The

United States now has available the kinds of landing craft that may be needed in any shore-to-shore or ship-to-shore invasion in any part of the world, so far as can be foreseen, on the basis of existing combat experience.

Under the direction of Rear Admiral Edward L. Cochrane, U.S.N., Chief of the Bureau of Ships, this gigantic landing craft program is being produced. One out of every 5½ dollars which the Navy is expending in 1944 for ship construction of all types is going toward the building of landing craft.

Now engaged in producing the landing craft are some 4,000 prime contractors, 30,000 sub-contractors and their hundreds of thousands of employees. The vessels are being assembled at some 74 shipyards over the Nation. Landing craft fall into some 15 major types.

The 15 distinct types have required special development in order to meet particular functions or missions. As with all the types, continuing development is necessary to gain increasing maximum efficiency of operation. The basic types, originally designed, have been improved upon, so that there are many variations of a particular species. Some types of these new warships, vital in amphibious operations, are

The LSD—Landing Ship, Dock—which is 450 feet in length, overall. This is a floating dock vessel's

The LST—Landing Ship, Tank—is an ocean-going vessel, especially constructed to transport and land tanks, tank destroyers, trucks, jeeps and other mechanized equipment. It was designed for shallow draft to facilitate beaching. In transoceanic service, it is weighted down with stores to make it more seaworthy. A high bow ramp lowers to disgorge the vehicles, which roll from ship to shore under their own power. The LST is 328 feet long, has a beam of 35 feet and carries a complement of seven officers and 57 enlisted men.

The LSM—Landing Ship, Medium—is one of the Navy's newest craft. It is smaller than the Landing Ship, Tank, and larger than the Landing Craft, Tank. The LSM is an ocean-going vessel, with a bow that opens, lowering a ramp down which men, machines and material roll onto enemy beaches. It is slightly more than 200 feet long and is a highly maneuverable vessel. With a broad, snub bow, the LSM was designed to bridge the long island-studded route to Tokio. Of high speed, it can range far. The vessel has a box-like appearance; is capable of carrying ample fresh water and fuel for long mission and has a complement of four officers and 48 enlisted men. A high-powered direct drive Diesel engine propels the LSM. The power of her tank and half-track load supplement the LSM's telling battery of anti-aircraft Oerlikons. The vessel's beam is 34 feet and in addition to berthing and messing facilities for her own ship's company, she can carry a small number of troops. A Bureau of Ships' official has dubbed this newest addition to the landing craft aggregation the "Pacific Puddle-Jumper." The craft is designed to transport light tanks, half tracks and gun carriers. Stern winch and anchor are used to draw

HOW VIBRATION TRANSMISSION FROM ENGINES MOUNTED ON CONCRETE FOUNDATIONS IS STOPPED . . . with KORFUND VIBRATION CONTROL

The sectional drawing shows an outstanding method, developed by The Korfund Company, of isolating Diesel engine vibration.

The engine is mounted on a concrete foundation in which is embedded a structural steel chassis. The projecting ends of the chassis are bolted to Korfund Steel Spring Vibro Isolators placed in pockets in the surrounding sub-base.

The entire weight of engine and foundation is resiliently suspended on the isolator springs. Hence all the dynamic forces arising

from the operation of the engine are checked before they can be transmitted to the building foundation or adjacent equipment.

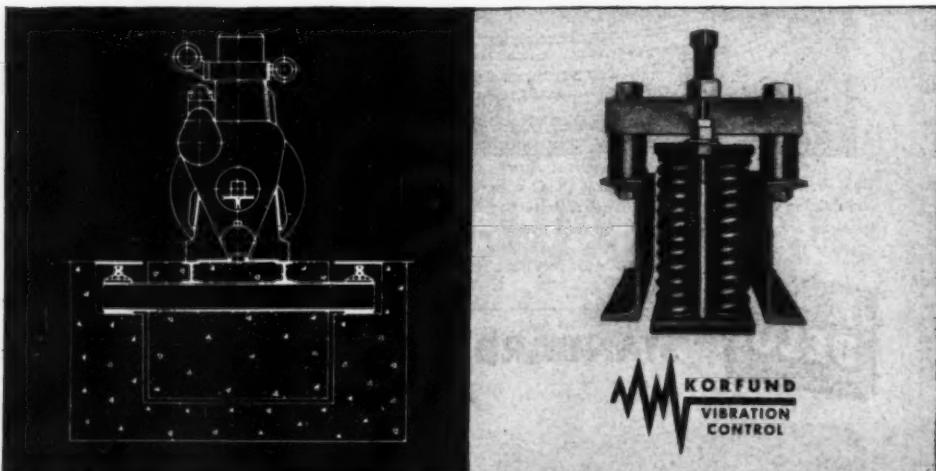
This is only one example of Korfund Vibration Control. Each application is considered as a separate problem. Solutions are based on more than forty years of experience.

Write for full information

THE KORFUND COMPANY, Inc.

48-28 Thirty-second Place
Long Island City 1, N. Y.

Representatives in Principal Cities



landing craft
s, 30,000 sub-
thousands of
assembled a-
ion. Landing

vessel off the beach after unloading. A typical
load includes several light tanks, medium tanks
and gun carriers. The vessel is equipped with
100 mm. guns.

The LCI (L)—Landing Craft, Infantry (Large)
is an oceangoing vessel, designed to transport
infantry forces for a large-scale invasion. Troops
embark by means of two large gangways,
located on either side of the bow. This type
of vessel has facilities for berthing and feeding the troops
on board for short periods. It has been used with
marked success on sandy beaches. Developed
for special landing operations, it beaches and
permits debarkation over outboard bow ramps,
starboard and port, which are lowered when
the ship comes to rest at the hostile shore. Its
capacity is about 200 troops with equipment
and cargo. The overall length is 157 feet and
the vessel's complement is two officers and 20
listed men.

The LCT (6)—Landing Craft, Tank—accommodates any type of tank. It was originally de-
signed with bow and stern ramps, but these
were found to be too heavy in the original
model. A plate has been substituted for the
ramp, astern, and is operable from that part of
the vessel, if desirable. To accommodate the
tanks, the quarters and housing were moved
to one side. This vessel was designed to land
tanks. Its overall length is about 100 feet.

The LCM—Landing Craft, Mechanized—operates with small assault craft, which land personnel. The LCM (3) is a larger type of this designation, capable of landing one medium tank or a bulldozer or other motor vehicle. It can land a 30-ton tank and has an overall length of 50 feet. This vessel carries a crew of four; capable of being transported as a deck load and can be lowered by the mother ship's booms. The LCM (6) has the same characteristics as the LCM (3), except for the length, which is 56 feet. The beam is 14 feet.

The LCC is the Landing Craft, Control—It is a control boat or navigational leader. It is used to lead a mass of assault craft on to the beach. Further, it acts as a survey craft and has modern signaling devices. It can be carried aboard a battery of 100 mm. guns. The beam is 34 feet. The mess is 14 feet. She can carry a crew of four officers and 16 enlisted men. The LCC is 36 feet long and has a beam of 10 feet.

The LCS is the Landing Craft, Support. The LCS (S)—the Landing Craft, Support (Small) furnishes fire support, both surface and anti-aircraft, in the area of landing. Its overall length is 36 feet six inches. It is equipped with machine guns, rocket launchers and rockets. It has a beam of 11 feet and carries a crew of five



Randolph "4" CARBON DIOXIDE FIRE EXTINGUISHER

A startled worker snatches the nearest extinguisher. No time now to think . . . hit the blaze before it does damage!

Randolph "4" simplifies—speeds fire fighting. Smothers flammable liquid, electric, machine fires with instant, easy action.

Approved and labeled by Underwriters' Laboratories, Inc.

Mobilize against fire with Randolph carbon dioxide. For prompt delivery phone your supply house or write us—today.



Easy! So obvious and easy . . . any employee can use it. No valves to twist or horns to raise. Just touch the trigger . . . and powerful carbon dioxide smothers the fire in a penetrating, icy blanket!

Safe! Randolph carbon dioxide does not conduct electricity or damage equipment. Dry and odorless . . . it disappears after the fire is out. Does a neat job!

Efficient! Carbon dioxide will not deteriorate. It remains effective even in extreme temperatures. Keeps maintenance at a minimum . . . eliminates annual refilling problem.



Randolph "2" Ready to combat sudden "flash" fires. This compact, small unit with exclusive Randolph design, is especially adapted for BUSES, TRUCKS, MARINE CRAFT. Ideal, instant protection for HOTELS, HOSPITALS, INDUSTRIAL KITCHENS.

SEND NOW for free booklet "Sharpshooting at Flames." Illustrates latest techniques in carbon dioxide fire fighting. NAME _____

ADDRESS _____

RANDOLPH LABORATORIES INC.

8 EAST KINZIE ST., CHICAGO 11, ILLINOIS



or six. It can be transported by ship's davits or on deck.

The LCVP is the Landing Craft, Vehicle and Personnel. It carries both fighting men and vehicles, trucks, tanks, etc. It is an assault craft, which may be utilized to carry cargo. This craft is equipped with a ramp for debarkation of personnel and has a capacity of 30 troops or a small group of small vehicles. It carries a crew of three and its overall length is 36 feet. The beam is 10 feet, 11 inches. . . .

Borg-Warner Salvages World War I Plant for World War II Production

AN abandoned factory, which at the start of the war was restored and equipped without using critical materials, has shipped the last of more than nineteen thousand 1300-pound Oerlikon gun mounts it has manufactured for the U. S. Navy.

The plant is the Norge Machine Products division of Borg-Warner. And the story of its

wartime achievement on the shores of Lake Muskegon entered a new chapter when O. H. Shenstone, works manager, revealed it already is producing a later type gun mount for the Navy.

In late November, 1941, the vacated building was acquired by Borg-Warner for the express purpose of filling the Navy contract. Discarded equipment at Freeport, Ill., some 300 miles away, was salvaged and moved into the renovated building. Less than five months after Pearl Harbor, the first of the 19,000 anti-aircraft gun mounts rolled from its production lines.

"We have been able to add some new machinery in recent months," Manager Shenstone mentioned today. "But at first, the ancient, braced up and overhauled machines had to produce precision parts on which tolerances of only 1-1,000th of an inch were allowable." The rehabilitated buildings and their 131,000 square feet of floor space also saw service in the first World War when the factory they housed manufactured 3-inch gun carriages.

Metallizing Company Appoints Henry D. Engelsman

THE Metallizing Company of America, manufacturer of Mogul metal spray equipment, announces the appointment of Henry D. Engelsman, Sales Manager and Technical Service Supervisor.

Wittek Hose Clamps Installed On Diesel Marine Engine

Type FBC

Type RN

Type RM

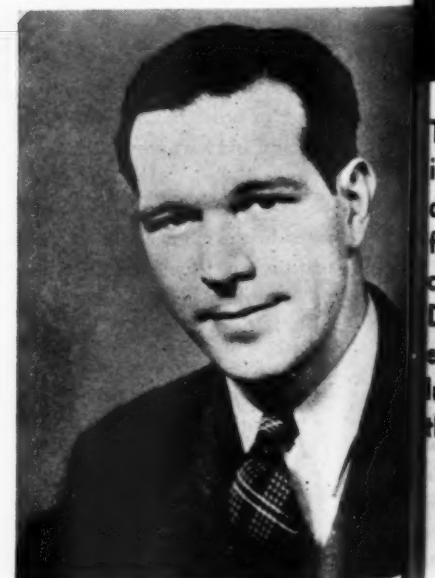
Type RW

Because of their simple design, rigid construction and easy installation, Wittek Hose Clamps assure dependable hose connections for Diesel engine builders. Long accepted by the automotive and aviation industries, Wittek Hose Clamps are now being proven in actual service with the armed forces of the United Nations as standard equipment for aircraft, tanks, jeeps, trucks, ships and other combat vehicles. Wittek Hose Clamps are made in many different sizes and types for Diesel applications: Type RW for hose connections of 5" in diameter and larger; Type RM for 3 1/2" to 5"; Type RN for 2 1/2" to 3 1/2" and Type FBC for 2 1/2" hose connections and smaller. Write for complete catalog. Wittek Manufacturing Co., 4305-15 W. 24th Pl., Chicago 23, Ill.

War Bonds for Victory—
Buy MORE in '44!

ARMY E NAVY

WITTEK HOSE CLAMPS
Dependable Hose Connections



Henry D. Engelsman

Mr. Engelsman has been associated with the company for two years as sales and service engineer—prior to that time he was employed by The DeVilbiss Company, as sales and service engineer.

Vacuum Test Pit for Impellers

THE large vacuum test pit in the Research Laboratory of the Buffalo Forge Company, Buffalo, is a good example of what is being done to study stresses and improve the quality of high speed rotating machinery. The pit—so termed because the shell is set in concrete below floor level, is 6 feet in diameter by 4 feet deep. It is made of heavy, reinforced construction to withstand absolute vacuum. While it was designed along the lines of the General Electric device for testing turbo-super-charger impellers and capable of operating at 60,000 rpm., it will generally accommodate larger fans at lower speeds.

In operation of the test pit, the impeller to be tested is hung by a slender shaft from a small air turbine mounted on the cover. A vacuum pump then exhausts the air from the drum so that it takes practically no horsepower to spin the fan. The pressure within the drum may reach as low as 200 microns of vacuum (.00787 inches of mercury absolute as compared to standard atmospheric pressure of 29.92 inches of mercury.) Under these conditions the power

to drive the fan (exclusive of the turbine friction) is about 1/4000 of the power under normal conditions. The acceleration must be gradual, the speed being under the constant control of the operator by means of an air valve and



View of the vacuum test pit developed by Buffalo Forge Company.

air brake. In order to keep the speed indicating device from absorbing power at the higher speeds, an electronic frequency meter is used. This is a direct reading dial type instrument

with suitable amplification.

Several purposes are served by a test pit of this type. To insure the safety of operation of cast or fabricated fans, the fan may be run at sufficient overspeed to permit calculation of the factor of safety. On new design the impeller may be tested to destruction in order to determine the weakest section or some unpredictable condition. For this reason there is supplied a laminated shield within the main shell so that the force caused by rupture will spend itself against this shield and not seriously harm the shell which maintains the vacuum. A check on fan balance can be made on high speed impellers that might otherwise be impossible, except at final installation. Thus, a fan that would require 1000 horsepower to drive normally can be operated in a vacuum of 200 microns of mercury by 1/4 air horsepower. Then there is an opportunity to study stress conditions while the unit is in operation. A glass aperture in the cover of the pit permits visibility of the impeller by stroboscopic light. Also through the use of strain gauges in circuit with a cathode ray oscilloscope, stresses and vibration may be visualized and measured.

WE WANT YOU TO KNOW

To this end we have prepared a completely informative bulletin embodying a general description with tabulation of outstanding features, specifications and performance curves on the Model "80" line of Buckeye Diesel engines. Each component part of the engine is illustrated and described; fuel, lube and cooling systems are traced on three-color sectional charts.

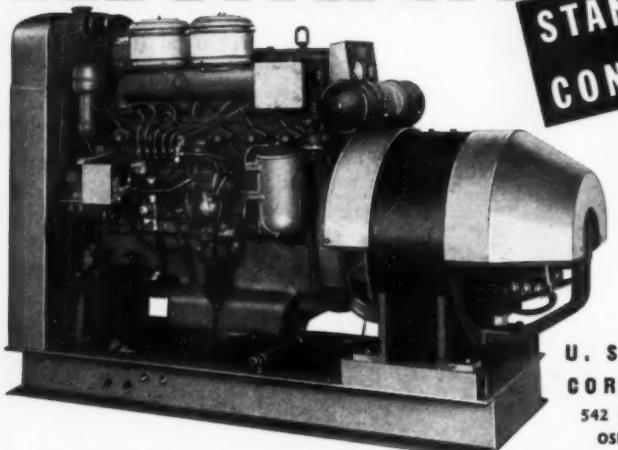


Write on your letterhead for your free copy of The Model "80" Buckeye Diesel Bulletin.



Be Profitwise and Dieselize with Buckeyes
THE BUCKEYE MACHINE COMPANY LIMA, OHIO

ELECTRICITY



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STAND-BY SERVICE
OR
CONTINUOUS DUTY

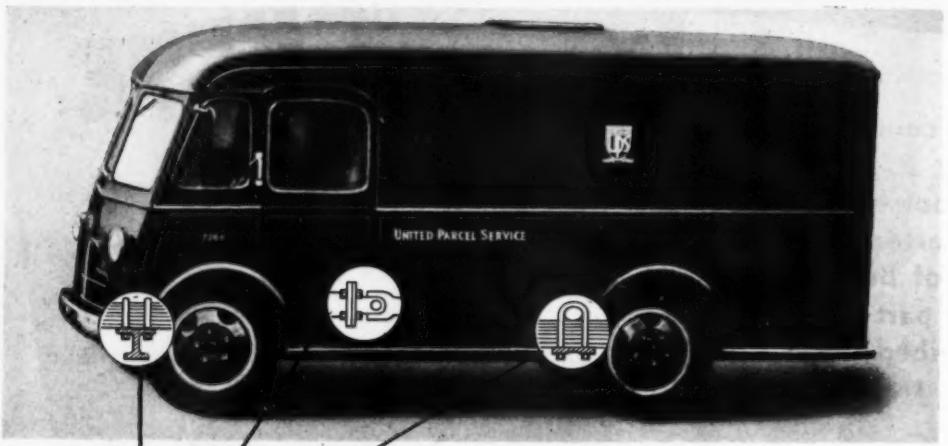
Complete range of units from 3 to 75 KW for all types of service. Where production does not interfere with Army-Navy requirements, U. S. Plants are now available on AA3 priority or better. Write.

U. S. MOTORS
CORPORATION
542 Nebraska Street
OSHKOSH, WIS.



U. S. DIESEL ELECTRIC PLANTS

The Boots Nut can be made standard equipment on even the first post-war models.



THESE NUTS TAKE A BRUTAL BEATING

... but, in a full year's test on U. P. S. trucks,
not a Boots Nut had to be re-tightened!

UNITED Parcel Service selected universal joint flanges and spring U-bolts on a number of trucks to test the Boots All-Metal, Self-Locking Nut. At the end of 6 months not one Boots Nut had required attention! After a full year of wearing, tearing duty every Boots Self-Locking Nut was still as tight as ever!

Because of its built-in, all-metal lock, the Boots Nut holds with a grip of steel! It never slips. It never deteriorates. It can be used again and again.

All Boots production today is reserved for military aircraft. But you can expect Self-Locking Boots on every kind of post-war motor vehicle.

BOOTS SELF-LOCKING NUTS

"There's No Excuse for a Nut Shaking Loose!"

Boots Aircraft Nut Corporation, General Offices, New Canaan, Conn.

D. E. Batesole Appointed Norma-Hoffmann Vice President and Chief Engineer

NORMA-HOFFMANN Bearings Corporation, Stamford, Conn., announces the election, at a directors' meeting on May 16th, of Mr. D. E. Batesole as vice-president and chief engineer. Mr. Batesole has been a member of the engineering department for over 25 years, and has been chief engineer since 1937.

Sperry Gyro Opens Marine Service Office

BECAUSE of the greatly increased demand of the Philadelphia area, the Sperry Gyro Company opened a Marine Service office in the Lafayette building, 437 Chestnut Street, Philadelphia, on July 1.

In announcing that for the first time Sperry marine service engineers would have a Philadelphia headquarters, Manager of the Marine Service Department John R. Conover who joined the company in 1916 revealed that currently Sperry is installing about four hundred times the marine equipment it did during World War I, while utilizing only about one-half the manpower required at that time. Present installations to be serviced include the Gyro-Compass, Gyro-Pilots, electro-mechanical steering systems and searchlights.

The Philadelphia office will be under the direction of John C. Stone, who joined the Sperry organization in 1939 after serving eight years in the United States Navy. Stone has been associated with the Philadelphia area for the past two and one-half years.

Ladish Issues New Catalog

THE new *Ladish Fittings Division catalog* just off the press. This is the first time such a catalog has been offered by Ladish Forge Co.

This new book is more than just a catalog, addition to the complete descriptions and specifications of the Ladish line of controlled quenched and tempered forged steel flanges, it also contains valuable engineering information, conversion tables, performance data . . . information that professional engineers use daily. It is claimed to be the only catalog available that contains ASA tables on Wartime Pressure Ratings.

In times like these, information of the type contained in the Ladish catalog is doubly valuable since it helps meet war production schedules by providing refinery, heating and power plant men and shipbuilders with a ready reference full of useful material. Copies can be obtained by writing, on business letterhead, to Ladish Drop Forge Co., Cudahy, Wis.

WEST COAST DIESEL NEWS

By JIM MEDFORD

AN all-brine boat, the *Charlene* of 215 tons will have a 6-cylinder, 600 hp. at 400 rpm., supercharged Enterprise Diesel; Monel metal shaft, Fairbanks-Morse generators and bait pumps; two 115 hp. Caterpillar auxiliary Diesels and standby generator set; by Martinolich of San Francisco.

THE same yard is starting the first of several 72-foot purse seiners for Andy Kuljis of San Pedro, California. Main engine is a 6-cylinder, 250 hp. Enterprise Diesel with full wheel house control.

THE Martinolich yard has completed the installation of a new 250 hp. Cummins Diesel in the combination boat *Admiral King* for Vince Cardinalli. The reduction gears are Twin Disc.

THE second boat with an Enterprise Diesel at four hundred feet, it did during 1943, is owned by Sal Tarantino and was completed by W. F. Stone & Son, Oakland, California; 81 only about 120 feet, power is a 250 hp., at 400 rpm., unit. This at that time the bow into seiner building.

AT Vancouver, B. C., the Menchions yard has completed a 78-foot packer for J. H. Todd & Sons. Main engine is a 200 hp. Canadian Atlas Diesel. Auxiliary is a 5 hp. Atlas-Lanova Diesel.

DUAL 150 hp. Buda Diesels with Twin Disc reduction (1.96-to-1) gears through flexible couplings to Morse chain 2.03-to-1 reduction drive reducing 850 rpm. engine speed to 210 rpm. at 76 by 60 wheel on hydraulic meter test all registered 9,860 pounds—66 ft. Navy tug.

AT the Star Shipyards, Vancouver, B. C., the first of three 78-foot purse seiners has been completed; *Cape Mark*, 200 hp. Washington Diesel; *Western Mariner* and *Western Commander* with 240 hp. Washington Diesels each Canadian Fishing Co., and Nelson Bros.

COSTING \$65,000 because of extra heavy construction, the 78-foot seiner *Pacific Sunset* by McKenzie Barge & Derrick North Vancouver yard for Nootka Packers has a 200 hp. Atlas Imperial Diesel under government subsidy plan.

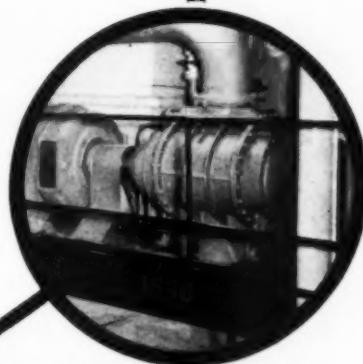
ADDEN and Lewis, Sausalito, California, have completed the last of the 66-foot tugs for Navy. Dual 115 Buda Diesels, Twin Disc and Morse reductions to single shaft, on trial a similar tug out-pulled an 80-foot tug with single 300 hp. Diesel, also Navy.

IT TAKES Proved Performance TO MAKE "FIRST TRIALS" SUCCESSFUL

The vital need for ocean-going tugs of the V-4 type in the war effort did not allow time for experiments. They had to be right from the first launching. The smooth speed and powerful performance of the "Sequin" on her first trials were to be expected—with such performances proved units in her hold as Roots-Connersville Superchargers. Let our supercharger application experience take the "experimenting" out of such problems for you.

ROOTS-CONNERSVILLE BLOWER CORP.

408 Midland Avenue
Connersville, Indiana

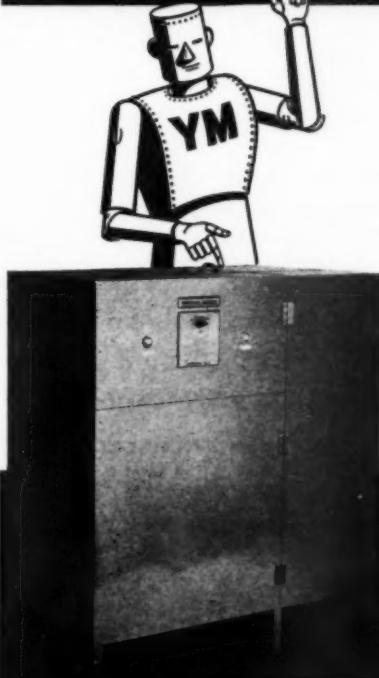


Above photo shows one of two motor-driven variable speed "R-C" Positive Displacement Superchargers on tug "Sequin." Capacity of each, 4200 c.f.m. at 1150 r.p.m., delivering against 3% to 4% lbs. manifold pressure.



★ HELP KEEP THE INVASION ROLLING—BUY WAR BONDS ★

Why you should select a YM OIL REFINER



- ★ Widely used YM process now continuous and automatic.
- ★ Removes fuel dilution, water, acids, carbon, dirt and similar matter... even restores oil from emulsions.
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- ★ Less labor than required by many quite ordinary filters.

Send for proposal on equipment for your requirements.

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YM ROBOT
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MASSEY GOVERNORS

NEW TYPE R
CENTRIFUGALS



Based on entirely new principles to meet the demand in the field of small and medium size engines for a very close regulating straight mechanical governor which would be small, more powerful and sensitive than anything of its size now available, entirely enclosed and at the same time of rugged construction.

Built in 3 sizes for exacting generator service or wide speed range marine, pump and compressor applications.

Suitable for either horizontal or vertical mounting.

Generator type interchangeable with marine and variable speed types so that same mounting, drive and linkage can be used.

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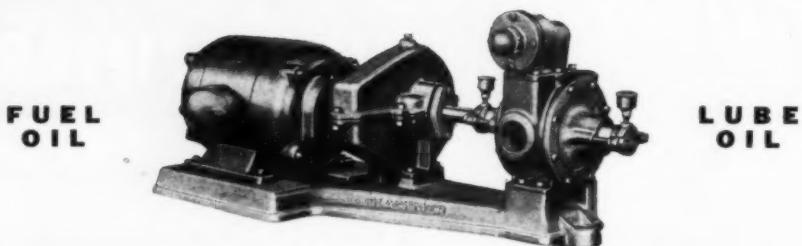
Builders of Jahns and Massey Governors For 36 Years

MASSEY MACHINE COMPANY

783 Pearl St.

Watertown, N. Y.

A DEPENDABLE PUMP for DIESELS



Blackmer Pumps are self-adjusting for wear due to "Bucket Design" (swinging vane principle), these pumps automatically compensate for wear. When finally worn beyond the critical point, normal capacity is restored by removing the head plate, pulling out the four worn buckets and inserting new ones. No special tools or skill are needed.

SPECIFY BLACKMER DEPENDABILITY FOR YOUR NEXT INSTALLATION

POWER PUMPS

Capacities 5 to 750 GPM
Pressures to 300 psi.

HAND PUMPS

Capacities 1 1/2 to 25 GPM
Pressures to 125 psi.

EZY-KLEEN STRAINERS

Capacities to 750 GPM
Sizes to 6 inches.

Send for Bulletin 304—"Facts about Rotary Pumps". Free to diesel men.

BLACKMER PUMP COMPANY
1968 Century Avenue, Grand Rapids 9, Michigan

THE Tacoma, Washington, yard of the Puget Sound Boat Co., has completed their first 30-foot utility boat for the U. S. Engineers. Engines are Cooper-Bessemer 675 hp. Diesel Equipment: Johnson Fries steering, F-M 15 kw shaft driven generator, Caterpillar auxiliary generating sets.

THE New Westminster, B. C., yard of the Star Shipyards are completing the 75-foot seiner-packer *Mercer* with 200 hp. Fairbanks-Morse Diesel for B. C. Packers.

FOR shark or halibut fishing, the new 60-foot vessel under construction by the Edwards yard Edmonds, Washington, for Bill Anderson, will carry a 85 hp. Atlas Imperial Diesel. A Fathometer and Introvox direction finder are specified.

SUPERIOR Diesels of 240 hp., 8 1/2 x 10 1/2, in cylinder, have been installed in the last three Maritime Commission 66-foot tugs for harbor duty by Siletz of Kernville, Oregon, and Eureka Shipbuilders, Eureka, California.

ANOTHER Superior Diesel, a five-cylinder 215 hp. engine has been installed in the tug *Edward A. Young* at Olympia, Washington. This replaces a 120 hp. Diesel for faster and heavier towing.

AT Gardiner, Oregon, the Fred Schulte yard has completed the second of their 65-foot fisherman for the Van Camp Seafood Co., San Pedro, California. The main engine is a 8-cylinder Caterpillar Diesel.

ANOTHER Caterpillar Diesel goes into the River Lines San Francisco Bay tug completed by Anderson & Christofani. In fact, it's a pair of 115 hp. engines with Twin Disc gears.

LENGTHENED to 54 feet, the baitboat *Sardinia* has been repowered with a pair of Caterpillar Diesels with 3-to-1 Twin Disc reduction gears and Monel shaft by Crofton, San Diego, California.

PORTUGUESA, a new 113-foot long range tuna clipper by Lynch yards at San Diego, California, has an 8-cylinder, 800 hp. Enterprise Diesel; Caterpillar Diesel auxiliaries; Fairbanks Morse generators, motors and pumps, and Fathometer.

AT the same yard another Enterprise Diesel six-cylinder, 400 hp., has been installed in an unnamed vessel known as *Hull 16* until sold. The auxiliaries of the 96-footer are also Caterpillar Diesels.

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hp. Diesel
g. F.M. 15 kw
llar auxiliary

SAN DIEGO Marine (California), has under construction an 80-foot fishing vessel for George Alameda and Tony Cantos. Main engine is a 320 hp. Atlas Imperial Diesel and two 80 hp. Atlas auxiliaries of 80 hp., Westinghouse generators.

A PAIR of Caterpillar Diesels will be added as auxiliaries to the new 155 hp. Atlas Imperial Diesel engined 74-foot tunaman by the Harbor Boat Works, San Diego, California, for West Williams; name *Corrina*.

the new 60-foot
Edwards yard
Anderson, w
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Mr. Dinic for five and a half years was with United States Steel Corporation of Delaware, with offices in Pittsburgh. Previously he served as an executive assistant with Eastern Gas & Fuel Associates, Boston. He is a graduate of the University of California, Berkeley and the Harvard Graduate School of Business Administration.

Two-Hundred Ninety-Five Diesels Described—Profusely Illustrated in the New Diesel Engine Catalog, Volume 9

EDITED by Rex W. Wadman, the 1944 edition of the DIESEL ENGINE CATALOG, Volume 9, contains descriptions and detailed specifications of 295 Diesel Engines. Each engine and equipment manufacturer's section has been revised and brought up to the minute. An up-to-date Market Place Directory of engines and accessories is included. It is the bible of the Diesel and allied industries, widely used by design engineers, naval architects, consulting engineers, operating engineers and personnel, users and potential users of Diesel prime movers and accessories. By far the biggest edition yet published—an indispensable book for all concerned with Diesels. Not a reprint of previous editions—price only remains the same, \$5. The supply is limited by the paper situation. Order your copy today—use convenient order blank elsewhere in this issue.

Carl J. Dinic Appointed Assistant To the President, American Locomotive Co.

CARL J. DINIC has been appointed Assistant to the President of the American Locomotive Company, Duncan W. Fraser, President of the company announced today.

Mr. Dinic for five and a half years was with United States Steel Corporation of Delaware, with offices in Pittsburgh. Previously he served as an executive assistant with Eastern Gas & Fuel Associates, Boston. He is a graduate of the University of California, Berkeley and the Harvard Graduate School of Business Administration.



A DIESEL ENGINE IS ONLY AS GOOD AS ITS VALVES

Diesel performance today is so dependent upon valves that it seems unnecessary for us to mention the fact. Yet—many a mechanic fools around with half-a-job of valve servicing because he hasn't HALL Valve and Valve Seat Servicing Equipment; he tries to make up for this lack through compressor, fuel injection or other adjustment. — but it won't work. Valves and valve seats must be serviced with the utmost precision and finest finish; then other units can be properly serviced and original factory performance and fuel economy assured. If you haven't HALL Valve Servicing Equipment consult your HALL Jobber today or write the factory for complete information.

THE HALL MANUFACTURING CO.
Toledo 7, Ohio,

Climax Double Duty *lightweight* MECHANICAL DRIVES POWER AND LIGHT DIESELS

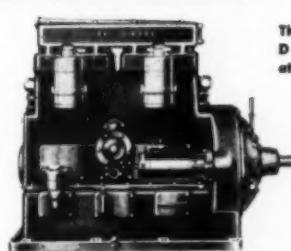
When you need dependable, ready-to-use power, up to 44 hp. or 30 KVA, specify Climax Diesels and Diesel Electric Plants.

FOR MECHANICAL DRIVES Climax Diesel engines are furnished completely equipped for direct or belt connection to any mechanical load within their operating range.

FOR POWER AND LIGHT Climax Diesel engines, directly connected to AC or DC generators provide electricity for far less than it costs to buy it.

The simple four stroke cycle operation, rigid yet lightweight construction and absence of complicated parts enable these engines to deliver efficient trouble-free service year after year. They are solid injection, compression ignition engines and operate on standard Diesel fuel oils. Two sizes are available. Model D 148 is

The Climax 4 cylinder Model D 297 Diesel engine rated at 44 hp. at 1200 r.p.m.

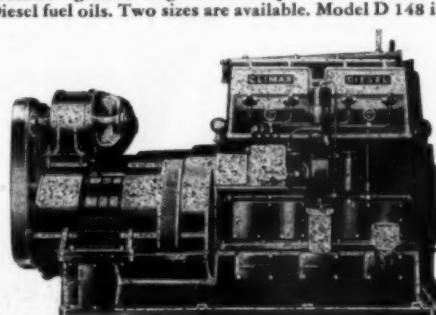


a two cylinder engine rated at 22 hp. Model D 297 is a 44 hp. four cylinder unit.

Climax Diesel Electric Plants are the above engines directly connected to AC or DC generators. Model DE 148 drives a 15 KVA generator and Model DE 297 a 30 KVA unit.

WRITE FOR BULLETINS

Separate bulletins, available for each Climax Diesel engine, contain specifications, performance curves, dimensional drawings, accessory equipment and complete description. For complete information write Climax Engineering Co., 1822 South Fourth St., Clinton, Iowa.

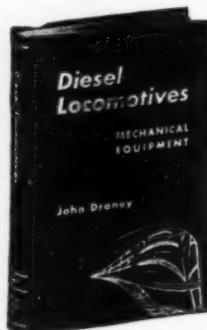


The Climax Model DE 297 Diesel Electric Plant directly connected to the 30 KVA generator.

Climax
Engineering Company
GENERAL OFFICES AND FACTORY, CLINTON, IOWA
REGIONAL OFFICES: CHICAGO, ILLINOIS • DALLAS, TEXAS
AFFILIATED COMPANIES: MILFOIL MFG. CO., CLINTON, IOWA



**RAILWAY
LOCOMOTIVE
ENGINEER
ADVISES
DIESEL**



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The First Books of their Kind.

**A practical guide to the operation
and maintenance of**

**RAILWAY DIESEL
LOCOMOTIVES**

By JOHN DRANEY,

**Past President, United Association of
Railroad Veterans**

In collaboration with Diesel technicians from American Locomotive Co.; Baldwin Locomotive Works; Electromotive Division of General Motors Corp.; General Electric Co.; Westinghouse Electric & Mfg. Co.; and many others.

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Characteristics of Engine Cycles—Combustion Principles in Modern Diesels—Combustion in High-Speed Diesels—Fuel-Injection Nozzles—Fuel-Injection Pumps—Lubrication and Cooling Systems—Governors—Supercharging and Turbo-Charging—Air Filtration—Caterpillar Diesel—Cummins Diesel—Hercules Diesel—Cooper-Bessemer Diesel—American Locomotive (McIntosh & Seymour)—Baldwin Locomotive Diesel (De la Vergne)—General Motors Diesel-Electro-Motive Division—Fairbanks Morse High-Speed Diesel—Description and Operation of Mechanical Equipment—Maintenance Instructions—Trucks—Auxiliary Equipment—Vapor-Clarkson Steam Generating Units.

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Current Electricity—Principles of a Generator—Ohm's Law—Electrical Power Measurements—Transmission Equipment—GE Light Weight Diesel Locomotive—BW Equipment for Switching Locomotives—Electro-Motive Equipment—Alco-GE 660 HP. and 1000 HP. Diesel-Electric Locomotives—Alco G-E Diesel-Electric Road Locomotive 2000 HP. Equipment.

388 pages, 235 illustrations, \$3.75

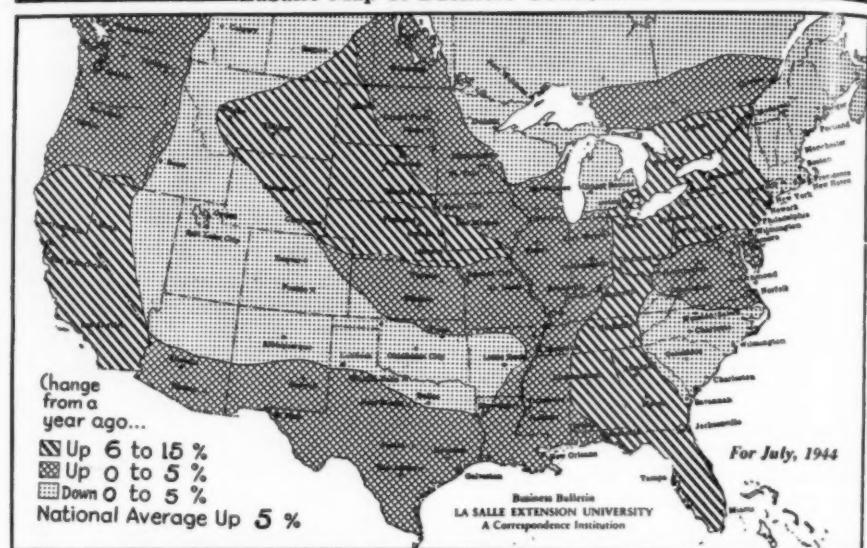
Both \$7.50 postpaid

Order from

DIESEL PROGRESS

2 West 45th St. New York 19, N. Y.

LaSalle Map of Business Conditions.



Business Activity Holds Quite Steady at Near Peak Levels

Map Supplied by BUSINESS BULLETIN DIVISION of La Salle

The rate of business activity has changed very little during recent weeks and the slight upward trend has been scarcely noticeable. Indications are becoming clearer and more convincing that the peak of the expansion period has been passed and that probably business will be maintained at relatively stable rates near to present levels for some time. It will be kept high by the enormous war expenditures and by the accompanying large consumer incomes.

The total volume of trade and industry, as measured by financial transactions, now averages about 5 per cent higher than it was last year at this time. The difference between the rates during the corresponding months of the two years will probably continue to become even less as activity remains on the present high plateau.

In spite of unfavorable weather conditions throughout the spring and early summer, the agricultural regions have been showing just as much stability as the industrial sections. Gains over last year have been somewhat greater in the West than in the East, although there are many exceptions among different communities and industries. These gains have been offset by declines in other places which make the national average only slightly higher than a year ago.

Shortages of labor and the continued restrictions on the production of many consumer goods lines have slowed down business in New England, throughout several districts in the East as well as in part of the Southeast. Production of military

supplies, shipbuilding, and the handling of shipments abroad have not quite made up for these reductions. Business volume in New York City and the surrounding territory has recently been making a better showing in comparison with the national average than it has for many months.

Conditions have become unusually varied throughout the South. Textile production has declined and military construction has been very low. Spending in connection with the military camps is not so high as it has been as more troops have been sent abroad. Business is better along the coasts than it is in the inland areas.

Throughout the Pacific Coast region, business has been holding up much better than in most other parts of the country. In many cities, the volume of trade is from 10 to 15 per cent higher than it was a year ago. The most significant industries are airplane manufacturing and shipbuilding. In the Rocky Mountain area, business is less favorable than in any other part of the country. The average in those states is a little below last year.

Canadian industrial activity is holding steady at around 8 per cent higher than it was a year ago. It is being maintained at this high level in the agricultural regions as well as in the industrial sections. The most striking gains continue to be made in the area north of the Great Lakes. Stability in industrial production, favorable agricultural conditions, and the large volume of foreign trade will help keep general business activity high.

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GENERATORS

A.C. and D.C.

Columbia A.C. and D.C. Generators are built to meet highest performance standards. Complete range of application, including light, power, ship auxiliaries, or custom designed units. Available in single bearing type for direct connection to engines. Write for information.

COLUMBIA ELECTRIC MFG. CO.
4519 Hamilton Ave., N. E. Cleveland 14, Ohio

Columbia A.C. Generators range from 6 1/4 to 300 KVA. Speeds and other specifications to meet requirements.

Aircraft Accessories Acquires Power Brake Division

By recently acquiring the Power Brake Division of the Besler Corporation, the Aircraft Accessories Corporation becomes manufacturers of a very complete line of brake equipment for commercial motor vehicles.

The Besler brake operations will be moved from Emeryville, to Burbank, California and incorporated with the Power Controls Division of Aircraft Accessories. This concern now is producing new and improved air brake valves for trucks, trailers and busses and a hydraulic power brake system for trucks and busses.

Manufacturing activities of the Besler vacuum type brakes will be expanded immediately, according to Randolph C. Walker, President of Aircraft Accessories Corporation, to meet the pressing demand for this type of equipment.

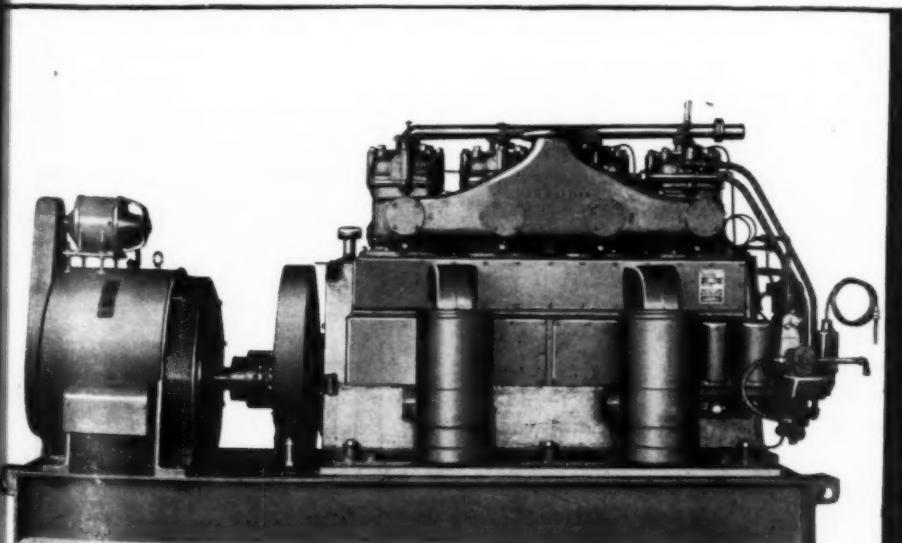
By drawing on its experience, Aircraft Accessories brings new and revolutionary developments into the automotive brake field. The application of aircraft design and principles to automotive brakes, states the company, results in new, high standards of safety, dependability and efficiency.

Just Off the Press—The Diesel Engine Catalog, Volume 9

VOLUME Nine, the 1944 Edition of the DIESEL ENGINE CATALOG, edited by Rex W. Wadman is now available. Not a reprint of previous editions but a completely revised Catalog of the Diesel and associated Industries. The only book of its kind offered, the DIESEL ENGINE CATALOG is indispensable for all who want to know the facts about the Diesel engines and accessories manufactured in the United States. Engine and equipment sections and Market Place directory have been revised and brought up to the minute; price is the same—\$5; a convenient order blank will be found elsewhere in this issue.

Atlas Announces Opening of New Western Sales Office

ATLAS Imperial Diesel Engine Company has announced removal of its sales organization from the Oakland factory and the opening of a new Western Division Regional sales office and showroom at 102 New Montgomery Street, San Francisco 5, California. The new sales office will be under the direction of William M. Griffith, sales manager, assisted by Archie C. Fries, sales engineer.



DUPLEX DIESEL ELECTRIC GENERATING PLANT,
600 RPM, 60 K.W.

Duplex Truck Co.
Lansing, Michigan

The SENSIBLE way to
CONQUER SLUDGE
and control the cause of
many engine troubles—
WITHOUT HARM TO ENGINES

To retard the formation of combustion residues (carbon) and to remove gummy deposits, carbon binders and sludge—just add POW-R-FLO to the lubricating oil, regularly, as prescribed by our Engineering Service.

The experiences of many operators of Diesel engines, in different fields, has proved that this is the most effective method of reducing accumulations of sludge and keeping it in suspension in the oil for easy removal by the filters—for maintaining CLEAN, EFFICIENT, FREE-RUNNING engines and lengthening the periods between overhauling jobs.

POW-R-FLO
THE SUPPLEMENTARY LUBRICANT

This highly efficient internal engine lubricant is a pure, treated mineral oil, free of all impurities and residues. It INCREASES the film strength of the oil to which it is added, minimizes film friction—even with heavy oils. It is HEAT-RESISTING and has HIGH CAPILLARY action.

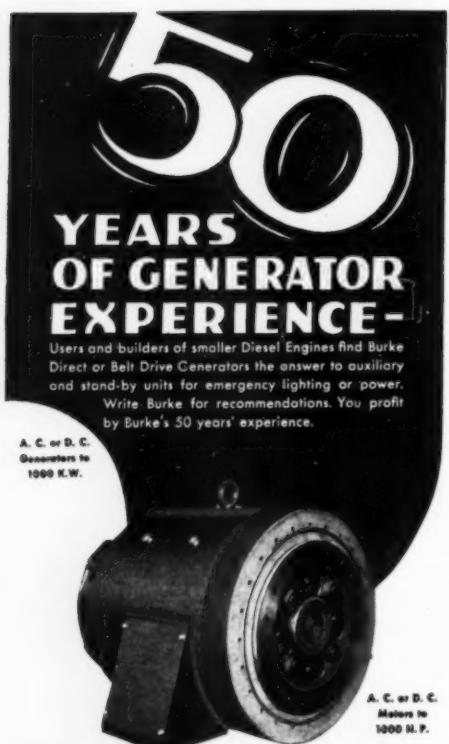
HARMLESS to any internal combustion motor—no matter how much is used. Yet it has an effective dissolving action on gummy deposits.

FREE DEMONSTRATION

Without cost or obligation, we will run tests of POW-R-FLO Prescribed Lubrication on one of your Diesel engines in use—and let YOU be the judge of its SAVINGS in operating and upkeep costs.

Write for full information

The MAUSTON CORPORATION
WINONA, MINNESOTA



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Diesel Engines!

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**Active Postwar Markets for
Diesel Engines Foreseen by
Cooper-Bessemer President**

PEACEFUL jobs are waiting for Diesel engines and the makers of the engines when the stop-order comes on landing barges and all other war craft now absorbing Diesel output, Gordon Lefebvre, president of Cooper-Bessemer Corporation, predicts.

"The word 'boom' may be a bit strong, but we certainly do not anticipate a prolonged postwar slump," he declared. "To meet war's requirements Diesel production has zoomed far beyond the highest point in the industry's history. We expect this production to hold more or less firm."

Reductions in initial and operating costs and increased horsepower in relation to weight and space are the advances which cause the Cooper-Bessemer president to believe wider postwar markets will open to Diesels and add to the pent-up demand from prewar buyers.

Although Diesel supercharging or turbocharging is relatively new, it is beyond the laboratory stage. Lefebvre said that his company's engines had increased in horsepower from 30 to 50 per cent with no increase in weight or space in adopting this principle. Cast aluminum and other strong but light materials also are contributing to the Diesel's progress in overcoming the weight factor, he added.

Questioned concerning specific postwar applications for Diesels, Lefebvre said his answer would have to be confined to the outlook for the medium-sized engines his company makes and plans to make after the war. These are above automotive size but not exceeding 2500 brake horsepower.

"Marine Diesels were enjoying an expanding prewar market and there is little to threaten a continuance when again we have peace," he said. "Operators of harbor and ocean-going tugs, river towboats, fishing boats, medium-sized freighters employing twin engines of from 1500 to 2500 horsepower each and designed for trade in ports not accessible to larger ships, yachts and ferryboats are some of the waiting buyers.

"A huge program of rural and small municipality electrification, largely Diesel-engined, will unquestionably get under way again and make up for lost time. Likewise, there is evidence that the oil and gas industry will require new engines for drilling and pumping for development of new and extended fields.

McCord
Class G.F.
LUBRICATORS

A modern lubricator for modern service on Diesel, gas, steam engines and compressors. Supplies dependable cylinder lubrication in metered quantities reducing friction and wear. Capacities: 2 to 24 p. and 1 to 16 feeds. New catalog on request.



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1500 ROOMS
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Double from \$6.50



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AN AUTOMATICALLY CONTROLLED DIESEL ENGINE

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A special FINE valve grinding or finishing compound recommended by Mfrs. and users of diesel engines for "lapping in" or "finishing" injector seats and injector valves. Trial can \$1.00 prepaid
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FOR TANK GAUGING EQUIPMENT FOR
DAY TANKS & CLEAN OIL STORAGE
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OPEN
An opportunity in California for a man who knows the Diesel Sales Business, both Marine and Stationary fields. Must be able to handle preparation of proposals and assist the manager of our Diesel Engine Division. This is a new unit of our company and offers unusual opportunity to a man qualified for the position now open. Address:

L. T. McGuire, General Sales Department
Joshua Hendy Iron Works, Sunnyvale, California

"It is difficult to foresee the outlook in the manufacturing industries. This has never constituted a major market for our Diesel engines, but there is the possibility that this market may attain far greater significance."

"It is obvious that the market possibilities in the huge railroad industry have not even been scratched, although Diesel-electric locomotives have shown some startling economies and advantages over the friendly old steam giants. So far perhaps the most significant conversion is found in switching engines. Diesel motive power for mainline service promises sensational advantages in speed and economy."

The favorable position already held by Diesels in operating costs has been enhanced, according to Lefebvre, by development of engines which will operate on Bunker C and similar inexpensive fuels. Initial cost for postwar buyers will be lowered not only by the mass production methods and standardization acquired during wartime, he believes, but by economical new manufacturing processes.

With reductions in cost and weight of the post-war Diesel engine an accomplished fact, Mr. Lefebvre believes that the most formidable barrier remaining to wider acceptance of Diesels will be removed when thousands of new, well-trained Diesel operators and mechanics are discharged from the Army and Navy.

1943 Editorial Index Now Available

A COMPLETE index of all articles and editorial material with a cross index of authors which appeared in the 1943 issue of DIESEL PROGRESS is now available. Copies of this ten-page index will be mailed upon request without charge. Write direct to DIESEL PROGRESS, 2 West 45th Street, New York 19, N. Y. for your copy.

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If you are familiar with diesel research and development, a leading Illinois diesel equipment company has an unusual opening for you in its engineering research department. Attractive, permanent proposition for the right man. Write fully, outlining your qualifications and experience. Address Box 143, Diesel Progress, 2 West 45th Street, New York 19, N. Y.

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Gaskets of all types and materials to give reliable service under all Diesel operating conditions.

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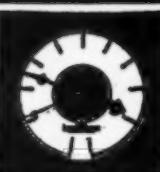
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THE COMPLETE LINE THAT COMPLETELY SATISFIES

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YOUR FUEL
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AT A
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THE LIQUIDOMETER CORP.

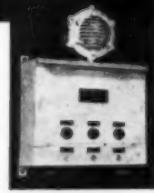
36-24 Skillman Ave., Long Island City, N. Y.

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Used on Maritime Commission, Army Transportation Corps, Coast Guard, Bureau of Ships Vessels.

The system is entirely automatic and does not depend upon manual operation of switches. In other words, no running back and forth to push buttons on the panel.

Send for our Bulletin No. 10



ABSOLUTE PROTECTION AGAINST LUBE OIL OR WATER TEMPERATURE.

BROWN AUTOMATIC ALARM Systems FOR DIESEL ENGINES

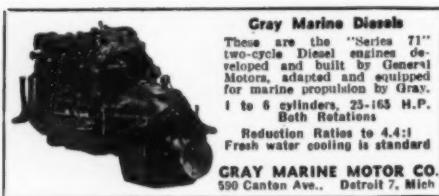
Manufactured by
FLECK ENGINEERING COMPANY
1505 EASTERN AVENUE • BALTIMORE 21, MD.



Performance "beyond the line of duty" has always been built into K-R Generators. . . . veterans of the grueling demands of two world wars. Over-building at every point of stress is typical of quality down to the smallest bolt.

If you want super-performance and low maintenance costs, write for circular that explains why.

KURZ & ROOT Company
APPLTON - WISCONSIN Since 1894
AC-DC GENERATORS AND MOTORS



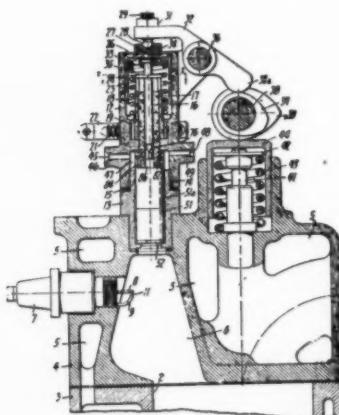
Latest Diesel Patents

A description of the outstanding patented inventions on Diesel and Diesel accessories as they are granted by the United States Patent Office. This information will be found a handy reference for inventors, engineers, designers and production men in establishing the dates of record, as well as describing the important Diesel inventions

Conducted by C. CALVERT HINES

2,315,907

INTERNAL COMBUSTION ENGINE
Allan M. Starr, Piedmont, Calif., assignor to Starr & Sweetland, San Francisco, Calif., a co-partnership composed of Ernest J. Sweetland and Allan M. Starr
Application December 6, 1940, Serial No. 368,828
14 Claims. (Cl. 123-32)



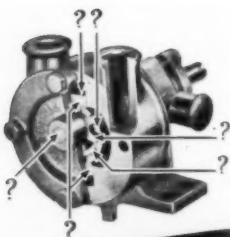
1. Fuel injector means for internal combustion engines comprising a plurality of injector nozzles each having an orifice; a pump plunger and a pump barrel; a plurality of ports leading from said barrel to said injector nozzles; valve means on said pump plunger to control the flow through said ports; and means to cause said plunger to rotate about its axis; said valve means having surfaces arranged and constructed to vary the discharge through said ports and nozzles by rotation of said plunger while said plunger is operating at a substantially constant length of stroke; said surfaces varying in shape to produce a greater variation in discharge through one of said nozzles than through the other.

2,327,934

PISTON RING EXPANDER
Allen W. Morton, Baltimore, Md., assignor to Koppers Company, Pittsburgh, Pa., a corporation of Delaware
Application October 28, 1939, Serial No. 301,839
3 Claims. (Cl. 309-43)



1. A ring expander for insertion in a ring groove behind a sealing ring, and comprising at least two approximately polygonal springs of strip material assembled side by side, and each having a gap to permit expansion and contraction, the proximate edges of said springs being curved to produce narrowed portions which subtend the major portions of the sides of the polygons, so that when the polygonal springs are thus assembled, with their angles staggered, they interengage to prevent relative rotation, and their combined width when assembled is only slightly less than the groove width.



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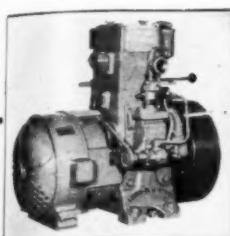
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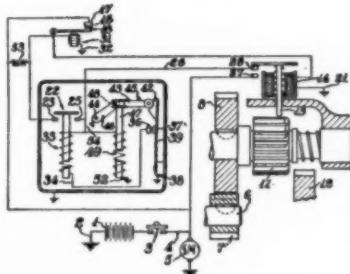
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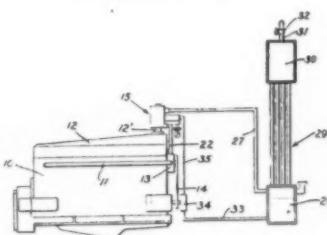
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2,327,960
ENGINE STARTER GEARING
Frank T. Christian, Elmira, N. Y., assignor to Bendix Aviation Corporation, South Bend, Ind., a corporation of Delaware
Application November 27, 1941,
Serial No. 420,662
4 Claims. (Cl. 290-38)



1. In an engine starter a starting circuit including a motor, a pinion actuated by the motor to engage and rotate a member of an engine to be started, a detent for opposing rotation of the pinion, electro-magnetic means energized upon closure of the starting circuit for actuating the detent to engage the pinion, electro-magnetic means energized upon actuation of the detent for causing release of the actuating means, and means for delaying effective energization of the releasing means for a predetermined time.

2,321,882
METHOD AND MEANS FOR COOLING
ENGINE CYLINDERS
John H. Wallace, Alhambra, Calif.
Application November 26, 1940,
Serial No. 367,259
25 Claims. (Cl. 123-174)



14. In combination with the fluid cooling jacket of an internal combustion engine or the like, a fluid cooling medium circulating pump, a conduit leading fluid from said pump into the cooling jacket and a return conduit from the cooling jacket to the circulating pump, whereby a constant flow of a fluid cooling medium will be maintained at a predetermined flow pressure, a pressure responsive valve housing interposed between the conduits and through which said fluid passes in its normal flow, said valve housing being divided into two compartments, one through which the fluid may flow continuously, the other in communication therewith, a pressure responsive valve element normally interrupting said communication, a conduit leading from said second named compartment, a condenser with which said conduit communicates continuously and whereby fluid relieved from the normal flow circuit by the opening of the pressure valve may be conducted to the condenser, means for returning condensate from the condenser and re-introducing it into the normal fluid flow through the engine jacket, a back pressure check valve in said condensate flow line, and means for establishing the predetermined pressure of fluid in the main path of flow at which the pressure valve will open to temporarily permit the relief of fluid from the main flow line and whereby the valve will close when said pressure equilibrium has been reestablished.

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ADVERTISERS' INDEX

Adel Precision Products Corp.	81	Illinois Testing Laboratories, Inc.	87
Aircraft Accessories Corp.	118	Korfund Company	106
Aircraft & Diesel Equipment Corp.	83	Kurz & Root Co.	118
Air-Maze Corporation	12	Liquidometer Corp., The	117
Aluminum Co. of America	34	Lister-Blackstone, Inc.	119
American Air Filter Co., Inc.	16	McCord Radiator & Mfg. Co.	116
American Bearing Corporation	18	McQuay-Norris Mfg. Co.	45
American Blower Corp.	41	Mack Manufacturing Corp.	86
American Bosch Corporation	1	Manzel Bros. Co.	120
American Locomotive Co.	116	Marine Products Co.	bet. 124
American Machine & Metals, Inc.	9	Marquette Metal Products Co.	26
Atlas Imperial Diesel Engine Co.	27	Massey Machine Co.	112
Auto-Diesel Piston Ring Co., The	119	Mauston Corporation, The	113
Blackmer Pump Co.	112	Maxim Silencer Co., The	7
Boots Aircraft Nut Corp.	110	National Jet Company	84
Borg-Warner Corp.	29	National Schools	119
Briggs Clarifier Co.	22	National Supply Co., The	11
Brodie System, Inc.	119	Nordberg Mfg. Co.	31
Buckeye Machine Co.	109	Norma-Hoffmann Bearings Corp.	117
Buda Co., The	13	Pedrick Piston Rings	36
Burke Electric Co.	116	Penn Electric Switch Co.	8
Busch-Sulzer Bros. Diesel Engine Co.	35	Penn Machinery Co., Inc., H. O.	129
B-W Superchargers, Inc.	28	Petrometer Corporation	117
Campbell, Wyant & Cannon Foundry Co.	21	Pickering Governor Co., The	129
Chicago Screw Co., The	103	Pierce Governor Co., The	115
Cleveland Diesel Engine Div., General Motors Corporation	60-61	Randolph Laboratories, Inc.	107
Climax Engineering Co.	113	Rogers Diesel and Aircraft Corp.	93
Columbia Electric Mfg. Co.	114	Romec Pump Company	25
Cooper-Bessemer Corp.	Fourth Cover	Roots-Connersville Blower Corp.	111
DeBothezat Division, American Machine and Metals, Inc.	9	Ross Heater & Mfg. Co., Inc.	82
Delco Products Div.	19	Saginaw Malleable Iron Div.	90
DeLuxe Products Corp., The	104	Schoonmaker Co., A. G.	117
Detroit Gasket & Mfg. Corp.	116	Scintilla Magneto Div., Bendix Aviation Corporation	45
Diamond Chain & Mfg. Co.	15	Sealed Power Corp.	101
Diesel Engineering & Mfg. Corp.	85	Sinclair Refining Co.	77
Diesel Engineers International Assn.	118	Socony-Vacuum Oil Co., Inc.	17
Double Seal Ring Co.	120	Sperry Gyroscope Co., Inc.	79
Duplex Truck Co.	115	Sperry Products, Inc.	40
Durabla Manufacturing Co.	5	Standard Oil Co. of California	106
Electric Auto-Lite Co., The	73	Star Electric Motor Co.	33
Electro-Motive Division	6	Sun Oil Company	46
Elliott Company	Third Cover	Synchro-Start Products	117
Enterprise Engine & Foundry Co.	23	Texas Company, The	Second Cover
Erie Forge Company	44	Tuthill Pump Company	118
Ex-Cell-O Corporation	91	Twin Disc Clutch Co.	92
Fairbanks, Morse & Co.	2-3, 90	U. S. Motors Corp.	110
Farrel-Birmingham Co., Inc.	80	U. S. Products Co.	117
Federal-Mogul Corporation	10	Van Der Horst Corp. of America	4
Felt Products Mfg. Co.	118	Victor Manufacturing & Gasket Co.	57
Fitzgerald Manufacturing Co.	117	Walworth Company	42
Fleck Engineering Co.	117	Weatherhead Company	73
Fluor Corporation, Ltd., The	100	Westinghouse Air Brake Co.	92
Fulton Iron Works Co.	99	Weston Electrical Instrument Corp.	95
General Machinery Corp.	20	Wilkening Manufacturing Co.	96
General Motors Corp., Cleveland Diesel Engine Division	60-61	Wittek Manufacturing Co.	100
Globe-Union, Inc.	102	Worthington Pump & Machinery Corp.	88
Graver Tank & Mfg. Co., Inc.	38	Young Radiator Co.	88
Gray Marine Motor Co.	118	Youngstown Miller Co., Inc.	111
Guiberson Diesel Engine Co.	94	SEPT	98
Gulf Oil Corporation	39	DIESEL PRO	98
Hall Manufacturing Co.	113		
Harman Process Co.	14		
Hendy Iron Works, Joshua	24, 117		
Holcomb Engineering Co.	118		